COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR02321823

Serial
A
V.52
1911
cop.1
Columbia University
in the City of New York
School of Dental and Oral Surgery
Reference Library

Digitized by the Internet Archive
in 2014

https://archive.org/details/transactionsofna1519nati

TRANSACTIONS

OF THE

National Dental Association

AT THE

FIFTEENTH ANNUAL MEETING

Cleveland, Ohio, July 25–28, 1911

AND OF THE

Southern Branch

AT THE

FOURTEENTH ANNUAL MEETING

Atlanta, Ga., April 4–6, 1911

PHILADELPHIA
PRESS OF THE "DENTAL COSMOS"
The S. S. White Dental Mfg. Co.
1912

DISCLAIMER.

THE NATIONAL DENTAL ASSOCIATION, although formally accepting and publishing the reports of the various Sections, and the Essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

CONTENTS.

GENERAL SESSIONS.

PAGE

First General Session 1
Meeting called to order by the president, Dr. E. S. GAYLORD 1
Addresses of welcome—
Hon. H. F. WALKER 1
Dr. A. O. ROSS 2
Dr. JAY T. NEWTON 3
Remarks in memory of W. H. Atkinson, by Dr. C. R. BUTLER 3
Reply to addresses of welcome—
Dr. BURTON LEE THORPE 5
President reads his annual address 7
Paper—Reading of Dr. SAFFORD G. PERRY's paper 7

Second General Session 7
Report of Committee on President's Address 7
Paper—Reading of Dr. R. OTTOLENGUI's paper 8

Third General Session 8
Recommendation adopted that the Miller Memorial Fund subscription list be kept open 8
Resolutions adopted concerning the reorganization of the National Dental Association 8
Paper—Reading of Dr. F. W. Low's paper 9
Meeting-place (Washington, D. C.) selected for the meeting of 1912, the time to be the second Tuesday in September 9
Election of Officers 9

Fourth General Session 10
Reading of the report of Committee on Scientific Research 10
Adjournment 10

EXECUTIVE COUNCIL.

PAGE

Minutes of Proceedings 11
Instructions given to print in the Transactions only such discussions as are presented in regular order at the time of the meeting 11
Certain bills presented and ordered paid 11, 30
Treasurer directed to restore to National Relief Fund the two hundred dollars appropriated irregularly to the Miller Memorial Fund .. 12
Official program indorsed 12
Discussion of an editorial appearing in the *Dental Digest,* Dr. CLAPP, the editor, being present 12
Recommendation to approve the action of the officers in sending an invitation to the F. D. I. to meet next year in the United States 12
Recommendation that the president appoint delegates to represent the N. D. A. at the Buffalo meeting of the International Association of Municipal Sanitation and Hygiene 13
Report of Committee on Necrology 13
Report of Dental Educational Council of America 16
Appropriation of fifty dollars toward the expenses of the National Educational Council of America 21
Resolution regarding the care of members who may need financial aid 22
Report of Pharmacopeial Committee 22
Report of Committee on Low Patent 24
Report of the Treasurer 25
Report of Committee on Dental Journal 26
Resolutions concerning the reorganization of the Association 26
Report of Committee on Army and Navy Dental Legislation 27
Recommendation that arrangements for next annual meeting—including exhibits—be under absolute control of Executive Committee 28
Printing of the Transactions for 1911 awarded to the *Dental Cosmos* 28
Report of Credentials Committee 29

Papers Read in General Sessions.

President's Address:
Annual Address of the President. By Dr. E. S. GAYLORD 31
Papers:
"The Evolution of Dentistry." By Dr. SAFFORD G. PERRY 33
"Dental Ethics and Dental Patents." By Dr. RODRIGUES OTTOLENGUI .. 44
Discussion 55
"Prophylactic Value of Potassium Sulfocyanate in Saliva." By Dr. FRANK W. LOW 64
Discussion 72
Report of Committee on Scientific Research. By Dr. HENRY C. FERRIS . 78
Discussion 95

SECTION I.

PROSTHETIC DENTISTRY, CROWN AND BRIDGE WORK, ORTHODONTIA, METALLURGY, CHEMISTRY, AND ALLIED SUBJECTS.

PAGE

Proceedings 97

Paper—"A Review of the Development of Orthodontia." By Dr. Frederick B. Noyes 97

Discussion 105

Paper—"Adapting Full Rubber Dentures." By Dr. Edward M. Kettig 113

Discussion 116

Paper—"The Question of Extraction in Orthodontia." By Dr. Calvin S. Case 124

Discussion 155

Paper—"Dental Impaction and Preventive Treatment." By Dr. Varney E. Barnes 182

Discussion 203

SECTION II.

OPERATIVE DENTISTRY, NOMENCLATURE, LITERATURE, DENTAL EDUCATION, AND ALLIED SUBJECTS.

Proceedings 213

Paper—"Mistakes, Common and Uncommon." By Dr. C. N. Johnson 213

Discussion 218

Paper—"Review of a Paper Entitled 'Wherein Clinical Evidence is At Variance with Extension for Prevention,' as read by Dr. P. B. McCullough," by Dr. W. R. Clack 224

Discussion 239

SECTION III.

ORAL SURGERY, ANATOMY, PHYSIOLOGY, HISTOLOGY, PATHOLOGY, ETIOLOGY, HYGIENE, PROPHYLAXIS, MATERIA MEDICA, AND ALLIED SUBJECTS.

Proceedings 245

Paper—"Secondary Calcifications of the Tooth-pulp." By Dr. Russell W. Bunting 246

Discussion 259

PAGE

Paper—"Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties." By Dr. C. M. McCauley 266
Discussion 281
Paper—"(I) A Group of Deformities of the Nasal Respiratory Tract, Coincident with Dental Irregularities. (II) A New Instrument for Comparative Measurements Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch." By Dr. Geo. H. Wright 286
Discussion 294
Paper—"The Necessity for and Training of a Prophylactic Assistant." By Dr. Alfred C. Fones 300
Discussion 305
Paper—"An Experimental Study of the Tooth-staining Properties of Various Colored Dentifrices." By Dr. W. H. O. McGehee 310
Discussion 340
Public Oral Hygiene Meeting 342
Paper—"History of the Oral Hygiene Campaign as Inaugurated by the Oral Hygiene Committee." By Dr. W. G. Ebersole 343
Paper—"Oral Hygiene As It Appeals to Educators." By Principal Cordelia L. O'Neill, Marion School, Cleveland, Ohio 352
Paper—"Experimental Oral Hygiene: An Epitome of a Year's Work and an Outlook into the Future." By J. E. Wallace Wallin, Ph.D. 359
Paper—"The Progress of the Work During the Past Year." By Dr. J. P. Corley 361
Reports—Subcommittees of the Oral Hygiene Committee 366

CLINICS.

Classification:

Gold Fillings 371
Casting Methods 372
Orthodontia 374
Oral Surgery: Treatment of Pyorrhea Alveolaris, Oral Prophylaxis, etc. 375
Porcelain 382
Crown and Bridge Work 384
Prosthetic Dentistry—Artificial Dentures 391
Miscellaneous 395

Appendix.

PAGE

Organization of the N. D. A. 403
Officers 403
Executive Council 403
Executive Committee 403
Organization of Sections 404
Committees—History 404
State and Local Societies 405
Dental Journal 405
Dental Museum and Library 405
Publication 405
Oral Hygiene 405
Necrology 405
Army and Navy Dental Legislation 406
Patents 406
Public Health 406
Clinics 406
Scientific Research 406
Pharmacopeial Convention 407
Educational Council 407
Revision of Constitution and By-laws 407
Publicity 407
National Relief Fund 407
Miller Memorial 407
Delegates to International Federation 407
Local Committee of Arrangements 408

List of Members 409
Permanent Members Without Dues 421

Past Presiding Officers 422
Prior to Consolidation—
Ex-presidents American Dental Association 422
Ex-presidents Southern Dental Association 422
Ex-presidents of the National Dental Association 423

PAGE
Constitution 424
Order of Business 432
Standing Resolutions 433
Rules of Order 434
Code of Ethics 435

FOURTEENTH ANNUAL MEETING OF SOUTHERN BRANCH.

(See pages 437 to 576. Contents, page 441.)

FIFTEENTH ANNUAL MEETING

OF THE

National Dental Association,

HELD AT

CLEVELAND, OHIO, JULY 25–28, 1911.

TUESDAY—First General Session.

The first general session of the fifteenth annual meeting of the National Dental Association was called to order at 10 o'clock Tuesday morning, July 25, 1911, in the auditorium of the Brotherhood of Locomotive Engineers' Building, Cleveland, Ohio, by the president, Dr. E. S. Gaylord, New Haven, Conn.

The President introduced the Rev. C. A. Eaton, Cleveland, who invoked the divine blessing on the deliberations of the association.

The President next introduced the Hon. H. F. Walker, vice-mayor of Cleveland, who made the following address of welcome:

Welcome from the City of Cleveland.

In behalf of the mayor, who is out of the city, I extend to you a most cordial greeting and hearty welcome. I offer you the keys of this the sixth largest city in the United States, and the best convention city in the country. I recognize the fact that the science of dentistry has made great progress in recent years, and particularly in this city have we evidences of that progress. I believe it was last year when some gentlemen of your profession tried an experiment upon our school children, and they found that the efficiency of some forty pupils selected out of a school of eight or ten rooms, numbering six or seven hundred children, was increased more than fifty per cent. I believe it was a gentleman of our city, who is a member of your association, that undertook the experiment, and I am told that you will hear from him later, and that he will tell you how he accomplished this result.

I am particularly glad to welcome you to this city. While we are always pleased to have visiting delegations come to our city, we are particularly pleased to have delegations that do so much for suffering

1

mankind. I can remember that, in my boyhood, when we had toothache we would simply go to the doctor around the corner and have the tooth pulled. I happened to be one of a large family of children who were all treated in the same way. Today, however, we save the teeth, to aid digestion and build up stronger men and women who will be able to do more for our country.

We wish you to enjoy yourselves to the fullest extent, and when you leave Cleveland we wish you to carry away with you the best wishes for our city. (Applause.)

Welcome from the Ohio State Dental Society.

Dr. A. O. Ross, Columbus, president of the Ohio State Dental Society, was next introduced and extended a welcome to the National Association on behalf of the state society, as follows:

As representative of the Ohio State Dental Society it affords me great pleasure to extend to you a most cordial welcome. We feel that we have a most honored guest—that it is a distinguished honor to us to entertain the National Dental Association, which we believe to be the most scientific dental organization in the world. Thirty years ago, if my memory serves me well, we had the pleasure of entertaining this association under its old name of the American Dental Association. I believe that this association has done more for the advancement of dentistry than any other organization. Today the American dentist is looked upon by the nations of the world as the most proficient.

For the benefit of those who are not acquainted with the profession's history in Ohio, I may be pardoned for calling attention to the part that Ohio has played in the advancement of our profession, by mentioning a few of its accomplishments and a few of the men who have helped in laying the foundation and achieving the work that was to follow. After the necessity for organizing had been recognized, in August 1844 the Mississippi Valley Association of Dental Surgeons was organized in Cincinnati, this being the third dental society noted in authentic history. A year later, in 1845, the Ohio College of Dental Surgery was organized by James Taylor, this being the second dental college. Wonderful advantages were thus offered to the young men of Ohio and neighboring states in securing dental education. The field was still further widened when in October 1847 the *Dental Register of the West* was issued, edited by Dr. Taylor, this being the first dental publication of the middle West. With these advantages the work went nobly on, and in 1866, when there seemed to be a demand for additional societies, the Ohio State Dental Society was organized. Today the society has 789 paid-up members in good standing. We are largely indebted for these achievements to such men as James Taylor, George W. Keely, George Watt, F. A. Hunter, F. H. Rehwinkle, Jonathan Taft, and W. D. Miller, the greatest scientific dentist the world has ever known. (Applause.) I would like to take more time to tell you what these men have done, but as my time is limited I shall have to deny myself that pleasure.

I might add, however, that the Ohio State Society has a library with approximately fifteen hundred volumes, which is open to the profession of the city and state. The society has also furnished seven presidents for the American Dental Association. Dr. Harris practiced dentistry in Bainbridge, Ohio, and, after

leaving there, established the Baltimore College of Dental Surgery, the first dental college.

From this abridged dental history of Ohio, you can see that this state has been ready and willing at all times to advance our profession. I will close by expressing my hope that you will enjoy being entertained in Ohio as much as Ohio enjoys entertaining you, and on behalf of the Ohio State Dental Society I again bid you welcome. (Applause.)

Dr. GAYLORD. Owing to the serious illness of Dr. Ebersole there will be no address of welcome from the Northern Ohio Dental Association. The next speaker I have the pleasure of introducing is Dr. Jay T. Newton, Cleveland, who will address us on behalf of the Cleveland Dental Society.

Welcome from the Cleveland Dental Society.

Dr. JAY T. NEWTON then spoke as follows: I consider this one of the greatest honors that has ever come to me, and I wish to assure the members of the National Association that we are ready for you. We have prepared a feast such as we believe has never before been attempted by any association—a feast that is for the benefit, further, of over ninety millions of people—and, as you partake of it, remember that it is for your good and that they may get the best out of it.

On behalf of our city society I want to say that we are one hundred and fifty strong, all here and all "live wires," and all ready to do our part in making this a meeting never to be forgotten.

It is said of one of our presidents—President Cleveland, I think it was—that on one occasion, when he wanted to send one of his aides on a mission requiring tact and diplomacy, after explaining to him what was expected of him, he dismissed him, but later called him back and said: "Let the other fellow do the talking!" That is what I want to do today. Again I extend to you a hearty welcome from the Cleveland Dental Society. (Applause.)

The next speaker of the day introduced by the President was Dr. C. R. BUTLER of Cleveland, who addressed the association as follows:

In Memory of W. H. Atkinson.

It is my very great pleasure on this occasion, the semi-centennial of the birth of this association, to speak to you briefly in memory of one who was active in the formation of the old American Dental Association, and who was honored by being elected its first president fifty years ago. I refer to Dr. Wm. H. Atkinson.

We have every reason to be proud of the old American Association, of which Dr. Atkinson was a prime mover and great factor, for it was the seed out of which sprang the National Dental Association which is here assembled. I am to speak of Dr. Atkinson particularly because of my association with him in the early days of his career, inasmuch as I entered his office in 1855 as a student, and on account of my slight frame and delicate health, he took me into his family and I became as one of his own children. On account of my intimate association with Dr. Atkinson, what little I have to say will be prompted by a personal knowledge of him, with his eccentric manner, his great skill, and his personal magnetism.

Dr. Atkinson was born in Pennsylvania, where he began the study of medicine. He soon showed considerable skill

in obstetrics, which he continued to practice long after taking up the practice of dentistry.

Unusual demands were being made upon the dentist in those early days, and he was called upon to distribute his services over a large field. Dr. Atkinson was an itinerant dentist for some years before settling in Cleveland in 1853, when he began to practice in a professional way. At that time, it must be remembered, dentistry was resting largely upon a commercial basis. He was called piratical for advocating the saving of teeth with exposed pulps. Extension for prevention had not yet been born; the main principle was extraction for the sake of substitution and revenue only.

Dr. Atkinson was the first dentist here to make any substantial advance in the fees for gold fillings or to urge a time basis in charging for professional services. After going to New York in 1861 he became known for his exorbitant charges for operations, which, no doubt, helped many another practitioner to obtain better remuneration for his operations than he had ever received before.

He was an advocate of a broad education for professional men, and was always ready to do his part in bringing it about. He was the first among his fellows, in order to make men more proficient in their work, to give public clinics in his office and before societies. And more than that—a very unusual thing at that period—his operating room was always open to students and practitioners.

In domestic life he had a very pronounced theory of family government, so much so that people came from a distance to see how it worked out in his family; but they went away disappointed. In his generosity he would often entertain strangers who proved to be anything but angels.

His personality was such that he would attract attention in a crowd anywhere; and, if he were to walk in here today, you would "sit up and take notice."

His personal magnetism was shown by his wonderful power of attracting people to him, especially those who wanted his services. His eccentricities assumed strange phases at times, and it was not unusual for him to receive and dismiss his patients with an embrace and a kiss.

Dr. Atkinson was a student of histology, and particularly microscopic anatomy; in fact, his great love was for microscopy.

His name on a program for a dental meeting was always a drawing card. This was because he was a ready speaker on scientific and pathological questions; also on questions not scientific when occasion demanded. At times his flights of oratory astonished his hearers, and his grasp of the question was beyond their comprehension. At meetings I have seen the stenographers stop and gaze in open-mouthed wonder at him; on these occasions, he said, the angels inspired him. He was replete with brilliant ideas, which he presented with such enthusiasm and force that it made him a great teacher, even of his *confrères*. In debate, when Atkinson crossed blades with Crawford, the Tennessee orator, there was a duel of words the like of which has never been witnessed in this body.

He was a prolific writer of papers, but had no disposition to put himself on record in text-books. In fact, he refused to do so, saying they were too soon out of date, since methods, because of advanced thought and improved technique, soon became obsolete.

Despite his eccentricities, he was a great man in mind and heart. No man can portray the real Atkinson; and I am conscious of having come far short of the artistic in this brief sketch. (Applause.)

Dr. GEORGE H. WILSON was next introduced, and welcomed the association on behalf of the Local Committee of Arrangements.

Dr. Gaylord then introduced Dr. BURTON LEE THORPE, St. Louis, Mo., who responded to the addresses of welcome, as follows:

Response to Addresses of Welcome.

I doubt if there is any sentiment I might express at this time that would meet with so unanimous indorsement as the one I am about to utter, and that is, We thank you gentlemen sincerely for your cordial expressions of good-will and for your magic words of welcome that have opened the doors of your heart and home to us. We are glad of the opportunity to visit this section that has contributed so much to the education, wealth, and industrial needs of the nation. We come in a reciprocal spirit, prepared to give and to take away some of the good things you have prepared for us. We come in the spirit of recreation to greet old friends and to make new acquaintances, with the belief that, as individuals and as an association, we may contribute our portion to human progress and to the knowledge of our fellows.

The progress of modern dentistry. Without conceit, we feel that the dental surgeon is a necessary adjunct to every community, and that each of our members adds to human health, comfort, beauty, and happiness. We are thankful that the intelligent layman has awakened to the fact that an ounce of prevention is better than a pound of cure, and much cheaper. It is a far cry from the beginning of the eighteenth century, when the barber surgeon—

> His pole with pewter basin hung,
> With rotten teeth in order strung,
> And cups, that in the window stood
> Lined with red rags to look like blood,
> Did well his threefold trade explain
> Who shaved, drew teeth, and bleeds a vein.

It also is a far cry from 1821, when Victor Hugo in "Les Misérables" pictured Fantine selling her two front teeth for a napoleon each to a street fakir of Paris to buy medicine for her supposed sick child, to the present, when the civic and educational authorities of our country and other countries realize the necessity for and sanction the organizing of free dental clinics in the public schools and eleemosynary institutions. Now it is almost an axiom that the person who looks after his soul but neglects his teeth is unworthy of the respect of cultured people. It is also axiomatic that a strong nation must have sound morals and healthy teeth.

Some philosopher has said, "The optimist takes all the lemons that are handed him and makes lemonade of them." So we who appreciate what the N. D. A. has stood for and accomplished in the past must needs view its future purely from an optimistic standpoint.

Rôle of the N. D. A. in dental progress. For many years this association has been the clearing-house for the latest and best in the advancement of modern dental surgery. It has not only educated the dentist, but has done much to teach the layman the necessity of the conservation of the human teeth, and has had a marked influence on the ethics and

esthetics of our calling, so that today it is only the "dental hobo" who places gold crowns on the anterior teeth to please an uncultured patient. This pernicious practice often reminds me of Tom Hood's poem, which vividly describes the wealthy and vain Miss Killmansegg, who wore her skirts high above her knee so that the populace might behold the beauty of her golden leg. The education of the public may best be brought about by the organization of a public press bureau under the direct auspices of this association. Regarding this subject in the past, we have apparently spent much time in washing our hands "with invisible soap, in imperceptible water," but the time has arrived in the opinion of many that at this time such a movement should be inaugurated.

Ohio's contributions to American and dental history. To us who are interested in our country's early history, it is a privilege to visit this section, where was enacted one of the most thrilling dramas in our nation's development, when the immortal Perry, commander of the fleet on Lake Erie, on the surrender of the British fleet, September 10, 1813, announced his victory to General Harrison in his memorable dispatch that will forever ring down the long lane of time, "We have met the enemy, and they are ours." It is a great pleasure for us all, I am sure, to visit this great state, the "Mother of Presidents," that has given the nation such distinguished statesmen as Harrison, Hayes, Garfield, McKinley, and the present capable and conservative chief executive, Wm. H. Taft, the first president to evidence an interest in the conservation of the teeth of the entire nation, for twice has he indorsed the work of the Oral Hygiene Committee of the N. D. A. by sending a personal representative to conferences of that committee held in this city. It was largely due to the pioneer labors of the Ohio State Dental Society and the Cleveland Dental Society, in conjunction with the Oral Hygiene Committee of the N. D. A., that the great economic and philanthropic undertaking of organizing the oral hygiene propaganda was brought about in this city in 1909 and 1910. It is also very gratifying for us as an association to visit the state that has the distinguished honor of having established the second dental college in the world's history, and the first dental journal west of the Alleghany mountains—to visit the state that gave to the profession such celebrities as James Taylor, George Watt, Wm. H. Atkinson, John Allen, Wm. H. Hunter, R. W. Varney, Geo. W. Keely, Corydon Palmer, F. H. Rehwinkle, Jonathan Taft of gentle and blessed memory, H. A. Smith, Chas. R. Butler of Cleveland, our immaculate friend who has grown gray so gracefully in the long practice of his profession, and that noted scientist, W. D. Miller, whose fame is worldwide and whose name is a household word wherever dental surgery is practiced. Each of these men is a beaconlight in dental history. They gave their best to their profession, and in return the profession gave its best to them. "They were pilgrims who traveled toward wine and gold and sunshine, but their hearts were set on something higher." They kept the faith, "They fulfilled the prophecies, they brought to pass the dreams, they realized the hopes that all the great and good and wise and just have made and had since man was man." There is no language in which to express the debt we owe, the love we should bear their memory.

They exemplified Joaquin Miller's sen-

timent, "There is room but for men on the firing-line"—

Aye, the place to fight and the place to fall—
As fall we must, all, in God's good time—
It is where the manliest man the wall,
Where boys are as men in their pride and prime,
Where glory gleams brightest, where brightest eyes shine,
Far out on the roaring red Firing-line!

Dr. H. J. BURKHART, chairman of the Executive Council, then made a report embracing the program for the day.

Dr. E. R. WARNER, Denver, Colorado, vice-president from the West, took the chair, and the president, Dr. E. S. GAYLORD, New Haven, Conn., read his annual address. [See page 31.]

Dr. WARNER appointed the following committee to consider the President's address and report at a later session: Dr. James McManus, Dr. W. W. Walker, and Dr. C. N. Johnson.

Dr. Gaylord resumed the chair, and announced as the next item on the program for the general session the reading of a paper by Dr. SAFFORD G. PERRY, New York, N. Y., entitled "Evolution of Dentistry." [See page 33.]

Adjourned until Wednesday noon.

WEDNESDAY—Second Session.

The second general session was called to order on Wednesday morning, July 26th, by the president, Dr. Gaylord, at 12 o'clock noon.

The first order of business was the report of the Council by Dr. Burkhart, who in outlining the program for the day, stated that in the evening the Oral Hygiene Committee would hold a public meeting in the auditorium.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

The Committee on the President's Address then reported as follows:

Your Committee on the President's Address respectfully submit the following report:

Regarding the desirability of establishing a public press bureau under the auspices of this association, there can be no question of the benefit to the public of such a movement, provided it is directed in the proper manner, and a careful supervision is made of the matter which is to appear.

Dental recognition by the Committee of One Hundred on Public Health would, if accepted in the proper spirit by the authorities of that organization, be one more factor in adding to the prestige and increasing the usefulness of our profession, and it is urged that the president's recommendation in this regard be indorsed.

The question of a relief fund for indigent and aged members of our profession has long enough been held in obeyance. The frequent spectacle of elderly and infirm dentists being thrown on the mercy of the world, to eke out a miserable existence in their declining years, has been presented to us in a manner to arouse the profession, and it is high time that this association should take some action to organize a movement and start a fund under proper supervision, to be used for this and other charitable purposes.

We therefore cordially indorse the recom-

mendations made in the excellent address of our president.

JAMES MCMANUS,
W. W. WALKER,
C. N. JOHNSON,
Committee.

The president, Dr. Gaylord, then presented to the association Lieutenant J. R. Bernheim, of the dental corps of the United States army.

Dr. Gaylord also introduced Dr. Salgado of Porto Rico, officially representing the Porto Rican Dental Society.

Dr. BURTON LEE THORPE. I am informed that several of our prominent members have been prevented from attending this meeting on account of illness, and I move you, sir, that the secretary be instructed to send a telegram on behalf of the association to Dr. Wm. Carr, New York; Dr. V. E. Turner, Raleigh, N. C., and Dr. F. O. Hetrick, Ottawa, Kans., expressing our regrets and our best wishes.

Dr. C. S. BUTLER. I am also informed that Dr. Wms. Donnally of Washington, D. C., one of our esteemed members who is nearly always with us, is confined to his home on account of illness, as is also Dr. H. A. Smith of Cincinnati, and I move that these two gentlemen be included in the motion.

The motion was carried as amended, and the secretary instructed accordingly.

The next order of business was the reading of a paper by Dr. R. OTTOLENGUI, New York, N. Y., entitled "Dental Ethics and Dental Patents." [See page 11.]

The general session then adjourned until Thursday noon.

THURSDAY—Third Session.

The third general session was called to order Thursday morning July 27th, at 12 o'clock, by the president, Dr. Gaylord.

Dr. BURKHART, chairman of the Executive Council, read a telegram of regret from Dr. John W. David of Texas, vice-president from the South, who was unable to be present at the meeting on account of illness.

Dr. Burkhart then outlined the program for the day, and also reported as follows:

The Executive Council reports with reference to the Miller Memorial Fund the recommendation that the committee continue and that the subscription list be kept open for additional funds.

The Executive Council reports that the Revision Committee, in accordance with a resolution passed at the Denver meeting, invited the various dental organizations to meet with them in Cleveland on July 24th. Twenty-four state societies were represented at this conference, and the committee presented the following resolutions, which the Executive Council approves and recommends to the association for favorable consideration:

RESOLVED, That in accordance with the expressed wish of the state delegates to the meeting which considered the alteration of the constitution, the National Dental Association will organize along the lines of the American Medical Association.

RESOLVED, That the draft of the constitution drawn in conformity with the above, be printed and forwarded to the state societies with the request that such as desire shall make application for constituent membership at the next meeting, stating how many members they can guarantee.

RESOLVED, That if properly supported by the state societies, the Constitution and By-laws will be finally revised and adopted at the next meeting, the same to take effect at the meeting of 1913.

On motion the report was adopted.

The President then announced as the next order of business a paper by Dr. F. W. Low, Buffalo, entitled "Prophylactic Value of Potassium Sulfocyanate in Saliva." [See page 64.]

The President then announced as the next order of business the selection of the time and place for the next annual meeting.

Dr. BURKHART. I wish to make an explanation, so that you may have before you the information with reference to the time of meeting. The proposed revised constitution and by-laws will be sent to the different state societies during the year, and many of them do not hold their meetings until May, June, and July of next year, so that they would not have an opportunity to report as to whether they would come in under this new plan, if we met in April for instance, as was done the last time the association went South. So it has occurred to some of the members of the committee and the Council that, in deciding on the time for next year, it should be later than when it was held at Birmingham, and that it should not be held during the extremely hot weather in July and August. I make this statement so that you may have the information before you in deciding on the time of the next meeting.

Dr. J. H. LONDON then extended an invitation on behalf of the District of Columbia Dental Society to meet in Washington, and suggested that the time be set for the second Tuesday in September.

Dr. H. B. TILESTON then invited the Association to hold its next meeting in Louisville, Ky.

On a rising vote Washington was selected as the next meeting-place, and the date set for the second Tuesday in September.

Election of Officers.

The next order of business as announced by the President was the election of officers for the ensuing year, which resulted as follows:

President—A. R. Melendy, Knoxville, Tenn.

Vice-president for the South—L. P. Dotterer, Charleston, S. C.

Vice-president for the West—D. O. M. LeCron, St. Louis, Mo.

Vice-president for the East—L. L. Barber, Toledo, Ohio.

Corresponding Secretary—C. W. Rodgers, Boston, Mass.

Recording Secretary—H. C. Brown, Columbus, Ohio.

Treasurer—H. B. McFadden, Philadelphia, Pa.

Executive Committee—J. D. Patterson, C. J. Grieves, and V. S. Jones.

Executive Council—H. J. Burkhart, Charles McManus, A. H. Peck, E. R. Warner, and B. Holly Smith.

The general session then adjourned until Friday, at 12 o'clock.

FRIDAY—Fourth Session.

The fourth general session was called to order at 12 o'clock noon, Friday, July 28th, by the president, Dr. Edward S. Gaylord.

The first order of business for the general session was the reading of the Report of the Committee on Scientific Research, by Dr. H. C. Ferris, New York, N. Y. [See page 78.]

Dr. H. J. Burkhart then made the full report of the Executive Council. [For Minutes of Executive Council see opposite page.]

Motion was made and carried that the report be adopted.

Dr. Burkhart. I move that a vote of thanks be extended to the Local Committee for the arduous labors which they have performed. They have worked faithfully ever since the Denver meeting, and have provided entertainment not only for the association members, but for their friends, and they are to be commended for the energy and enthusiasm shown in their work here. I therefore move that a rising vote of thanks be tendered to the local committee.

The motion was carried, and the association extended a rising vote of thanks to the committee.

Dr. C. S. Butler. It is always well, I think, to provide for an emergency relative to our next annual meeting. The time fixed for the next meeting is the second Tuesday in September, but as it has been necessary in years past to change the date for some special reason, and in order to provide for such a contingency, I move that the President and Executive Council be empowered, should conditions demand a change of date, to fix another date than that provided for in the action already taken.

The motion was carried.

Dr. Butler. As it is absolutely impossible for the Executive Council to comply with our rules, that is, to appoint the standing committees and officers of sections at this time, I move that the Executive Council be empowered to meet later and appoint the section officers and the usual committees at the convenience of the Council.

The motion was carried.

Dr. H. C. Brown moved that a vote of thanks be extended to Dr. J. W. David, Corsicana, Texas, for providing gavels for the past presidents and for the retiring president. (Motion carried.)

The newly-elected officers were next installed into office.

Dr. Burkhart moved that a rising vote of thanks be extended to the retiring president, Dr. Gaylord, for his work during the past year in behalf of the association.

The motion was carried.

Dr. Gaylord thanked the officers, committees, and members for their loyal support during his term of office.

Dr. A. R. Melendy, Knoxville, Tenn., the newly-elected president, then declared the fifteenth annual meeting closed and the association adjourned until the next annual meeting.

MINUTES

OF THE

EXECUTIVE COUNCIL.

Meeting in New York City,

October 1, 1910.

The Executive Council met in New York city, pursuant to call, on October 1, 1910. The meeting was called to order by Dr. H. J. Burkhart, chairman, at 10.45 A.M. Others present were: Drs. E. S. Gaylord, B. Holly Smith, C. L. Alexander, and H. C. Brown. Dr. Burkhart presented the proxy of Dr. A. H. Peck, and Dr. Gaylord the proxy of Dr. Jas. G. Sharp.

Dr. Burkhart presented a letter from Dr. Kirk relative to publishing discussions prepared subsequent to the time when the papers were presented. On motion of Dr. Smith, the secretary was directed to advise Dr. Kirk to publish only the discussions presented in the regular order at the time of the meeting.

The Secretary was authorized to draw an order for $50.00, being the amount appropriated toward the expense of the Educational Council.

The Council next took up the question of the appointment of section officers and committees. [For appointees see Appendix.]

On motion of Dr. Alexander, the chairman of the Executive Council, the President and the Recording Secretary were authorized to fill vacancies in committee appointments, and to act upon and dispose of such other *ad-interim* business as should come up for consideration.

On motion of Dr. Smith, the chairman of the Publication Committee was authorized to edit the report of the Oral Hygiene Committee prior to its publication in the proceedings of the association.

The Recording Secretary was instructed to look after the details of the program, and to see that appropriate membership buttons were secured by the Local Committee.

The following bills incident to this meeting, with one printing bill, were presented, and on motion were ordered paid:

B. Holly Smith	$25.00
C. L. Alexander	60.00
H. J. Burkhart	40.00
E. S. Gaylord	13.00
H. C. Brown	55.00
New Franklin Printing Co.	16.50

On motion the Council adjourned.

Edward S. Gaylord, *Pres.*,
Homer C. Brown, *Rec. Sec'y.*

SESSIONS AT CLEVELAND.

First Session.

The Executive Council was called to order by the chairman, Dr. H. J. Burkhart, in the committee room of the Engineers' Building, July 25th, at 3.30 P.M., with the following members present: Drs. H. J. Burkhart, E. S. Gaylord, A. H. Peck, C. L. Alexander, B. Holly Smith, and H. C. Brown.

Dr. JOHN S. MARSHALL appeared before the Council in behalf of the California Relief Fund. He called attention to the incorrect name of this fund, which should be "National Relief Fund." He also called attention to the appropriation of $200 from this fund to the Miller Memorial Fund, and stated that this was contrary to the resolution passed by the California Relief Fund Committee.

On motion, the Treasurer was directed to transfer from the general fund to the National Relief Fund the $200 which had been appropriated to the Miller Memorial Fund.

Dr. L. G. NOEL appeared before Council advocating a plan to raise funds for aged and invalid dentists, and read a paper, which had been presented before several state societies, outlining his plans. There being no objections, action on this matter was postponed until the Committee on the President's Address submitted their report.

On motion the names of Drs. Wilbur F. Litch, J. A. Hall, and Wm. H. Trueman were recommended to the association to be placed on the list of permanent members without dues.

The program as prepared and distributed by the Program Committee was adopted as the official program, such changes as found necessary to appear in the daily programs.

Dr. Geo. Wood Clapp, editor of the *Dental Digest,* appeared before the Council in connection with an editorial which appeared in the July issue of his journal. Dr. Clapp presented his side of the question, and was followed by Drs. H. J. Burkhart, Burton Lee Thorpe, Chas. S. Butler, H. C. Brown, B. Holly Smith, H. A. Kelley, C. L. Alexander, and Herbert L. Wheeler. After a long-continued and animated discussion the subject was passed.

Lieut. J. R. Bernheim, of the army dental corps, presented credentials showing that he had been officially delegated to represent the corps at the present meeting.

On motion the Council adjourned to meet at the Hollenden Hotel at 10.30 Wednesday morning.

Second Session.

The Council met in parlor "P," Hollenden Hotel, July 26th, at 10.45 A.M., with all the members present.

The Secretary called the attention of the Council to the fact that the officers had sent, through Dr. Edward C. Kirk, an engrossed invitation to the International Dental Federation to meet in America next year, as follows:

COLUMBUS, OHIO, U.S.A., July 10, 1911.

TO THE BUREAU AND MEMBERS OF THE FÉDÉRATION DENTAIRE INTERNATIONALE.

Greeting!

Realizing the purpose which animates your honorable body in its work for the elevation

of the standards of dental science and practice throughout the world, and the similar ideals which animate the activities of the National Dental Association of the United States of America, we, the undersigned officers of the National Dental Association, U.S.A., cordially invite the members of the Fédération Dentaire Internationale to hold its next annual meeting in the United States of America, at such time and place as may be most practicable and agreeable.

In presenting this invitation, we do so with the assurance of our deep and cordial interest in the work of the Federation, and we believe that if our invitation can be accepted by your honorable body, the holding of your next meeting in the United States will tend not only to greatly increase the general interest among the dental profession of our country in the work of the F. D. I., but will do much to enhance the practical interest of the American dental profession in the next International Dental Congress to be held in London in 1914.

Hoping for your favorable action, we are, on behalf of the National Dental Association of the United States of America,

EDWARD S. GAYLORD, *President*,
CHAS. W. RODGERS, *Cor. Sec'y*,
HOMER C. BROWN, *Rec. Sec'y*.

On motion, the action of the officers in this matter was approved, and it was recommended that the association ratify such action.

Dr. CHAS. S. BUTLER addressed the Council relative to the International Association of Municipal Sanitation and Hygiene, to meet in Buffalo in 1912.

On motion, the Council recommended that the National Dental Association be represented at that meeting by delegates to be appointed by the president.

The Secretary reported that Dr. Wilbur F. Litch, chairman of the Committee on Necrology, had sent in his report, as follows, and on motion it was received and ordered printed:

REPORT OF THE COMMITTEE ON NECROLOGY.

The Committee on Necrology reports that since the annual meeting of 1910 seven members of the National Dental Association have been removed by death, namely—Dr. John B. Rich, Dr. E. D. Brower, Dr. Robert Weston Talbott, Dr. Roderick McLean Sanger, Dr. W. Storer How, and Dr. J. Q. Byram.

Dr. John B. Rich.

JOHN B. RICH died in New York, N. Y., Friday, August 12, 1910, in his one-hundredth year. Dr. Rich was born in New York in 1811. The *Dental Cosmos* for October 1910 supplies the following particulars regarding his career.

Dr. Rich's father was a man of independent means and a scholar. When the boy was one year old, the father was killed in the war. As a boy he ran away to Philadelphia, shipped as a cabin-boy to see Africa, jumped overboard at Funchal, Madeira, because he was ill-treated, was rescued by a French ship and adopted by a Parisian diplomat who happened to be on board. He was educated at the military academy of St. Cyr. After graduating in medicine, Dr. Rich obtained an English passport and traveled extensively. He entered the service of Mohammed Ali Pasha, then Khedive of Egypt, and as an officer in the Pasha's forces partook in the naval expeditions dispatched to take Constantinople in 1834. While in Egypt Dr. Rich met and married the daughter of the English ambassador to that country.

In 1836 he began the practice of dentistry in New York, and in the same year founded the organization from which grew the American Dental Association. After several years of practice he made numerous trips abroad, where he studied and engaged in dentistry in France, Belgium, and Germany, and obtained diplomas for advanced work. He continued his practice until 1908, when he retired. Dr. Rich leaves a son of seventy-six, who lives in England.

Dr. E. D. Brower.

Dr. E. D. BROWER died October 10, 1910, at LeMars, Iowa, from paralysis, in his fifty-third year.

He was born in Leesville, Carroll county, Ohio, January 15, 1858. He began the study

of dentistry in 1878, with Dr. J. K. Morrison, at Ackley, Iowa, and the following year entered the dental school of Ann Arbor, from which he was graduated in 1881. He immediately began the practice of dentistry in LeMars, continuing there until the time of his death.

Dr. Brower was a member of the state and local societies, and was for many years secretary of the Board of Dental Examiners of the State of Iowa, in which capacity he served with faithfulness and efficiency, until death closed his useful and honorable career.

Dr. Robert Weston Talbott.

An obituary in the *Dental Brief* for June 1911 supplies the following particulars regarding his career:

Robert Weston Talbott was born in Richmond, Ohio, January 23, 1859. His parents were Dr. Thomas Morgan and Matilda (Tipton) Talbott. He came with his parents to Washington in 1869, and at the age of twelve years was appointed a page in the United States Senate through the influence of his uncle, Senator Tipton of Nebraska. While there his sterling qualities attracted the attention of Roscoe Conkling of New York, who made him his special messenger, and through whose influence he was retained until he was seventeen—one year beyond the age limit. He acquired some knowledge of dentistry in the office of his father, but later entered the dental department of the University of Maryland, from which he was graduated in 1888. While there he was awarded three prizes and a gold medal. He began the practice of his profession in Washington immediately upon his return from the university, and continued it until his death, March 10, 1911. He was an esteemed member of the District of Columbia Dental Society, as also of this National organization.

Dr. Roderick McLean Sanger.

Roderick McLean Sanger died April 16, 1911, at East Orange, N. J., of arteriosclerosis, in his fifty-sixth year. An obituary notice in the *Dental Cosmos* for June 1911 gives the following data:

Dr. Sanger was born in New York fifty-five years ago, and with his parents moved to Orange, where he attended the public school, completing his early school education at the Newark Academy. After having engaged in various trades he decided to take up dentistry, and entered as an apprentice in the offices of Drs. Richards and Levy, at Orange.

Fitted with a practical knowledge of his future profession, he entered the New York Dental College, from which he was graduated some thirty years ago. He immediately opened a dental office in his home town, and there quickly built up a lucrative practice. Very shortly afterward he married Miss Mary Gray of East Orange, who, together with one daughter, Miss Katherine Sanger, and one son, Dr. Frank W. Sanger, survives him.

Dr. Sanger was a prominent member of the New Jersey Dental Society and an active member of the Central Dental Association of New Jersey, having served frequently as delegate to the state meetings. He retired from practice about a year ago.

Dr. W. Storer How, D.D.S.

The following data relating to Dr. How have been supplied by Dr. William R. J. Griffin:

Woodbury Storer How, fifth and youngest son of John and Susan (Gates) How, was born in Portland, Me., June 25, 1829. After a course of education at Foxcroft Academy, Me., Dr. How entered the office and laboratory of Drs. E. Bacon and C. C. Coffin, dentists of Portland, Me., from whom he received his first instruction in the dental art. In the summer of 1851 he became the pupil of Dr. Benjamin Lord of New York.

In 1852 Dr. How went to Philadelphia and entered the Philadelphia College of Dental Surgery, and on February 28, 1854, received the degree of Doctor of Dental Surgery. His graduation thesis was on "The Mutation of the Inferior Maxillary." After his graduation Dr. How located in Cincinnati, Ohio.

On May 21, 1861, Dr. How entered as a private in the Ninth Regiment of New York State Militia. He passed through the war and was mustered out, as brevet major, captain and assistant quartermaster U. S. Volunteers, on June 10, 1866.

Dr. How was married on August 8, 1867, at Auburn, N. Y., to Miss Clara Ely Dewey.

Dr. How was a member of the Cincinnati Literary Society, a member of the American Dental Association, a permanent member, without dues, of the National Dental Association, a member of the Mississippi Valley Dental Association, a president of the Cincinnati Dental Society, and a trustee of the Ohio Dental College.

Dr. How contributed many papers on dental subjects which have found their way into many text-books and have been translated into many languages. His death occurred in Philadelphia, Pa., July 10, 1911.

Dr. John Quincy Byram.

The following facts regarding the life and professional career of Dr. Byram have been supplied by Dr. Carl D. Lucas:

JOHN QUINCY BYRAM was born at Paragon, Ind., June 1, 1871. When nineteen years of age he went to the state of Washington, where he served for three years as assistant in the dental office of Dr. L. E. Ervin of Seattle.

In 1893 he came to Indianapolis and took up the study of his chosen profession at the Indianapolis Dental College, and was graduated with honors in 1896. During his three years' course in dentistry he maintained a dental office in Irvington, a suburb of Indianapolis, practicing by authority of a temporary license permit granted by the State Board of Dental Examiners. After his graduation he retained his practice in Irvington until the fall of 1898. In 1896 he accepted a position in the Indiana Dental College as clinical instructor in the infirmary.

In the fall of 1898 he gave up his practice in Irvington to devote his entire time to teaching at the Indiana Dental College. His first chair with the faculty was that of prosthetic dentistry. In 1901 he took the chair of crown and bridge work. In 1902 he began his self-prepared course of instruction on porcelain work. In the meantime he had charge of all the teaching of prosthetic technics from 1896 to 1908. From 1908 until his death he taught advanced technics, prosthetic dentistry, crown and bridge work, and porcelain work, and was clinical instructor at the college.

In 1906 he served as president of the Indiana State Dental Association, and in 1911 as the president of the Institute of Dental Pedagogics, at the Washington, D. C., meeting. In addition to his membership in the National Dental Association, he was an active and enthusiastic member of the Delta Sigma Delta Fraternity and was elected Supreme Worthy Master of the fraternity at its Denver meeting in 1910, having served four years previously as its treasurer.

In 1907 he published a book entitled "The Art of Filling Teeth with Porcelain." His services as lecturer and clinical demonstrator were very much in demand, and for the past eight years he has lectured upon and demonstrated scientific dental operations before dental associations within nearly every state in the Union.

On account of overwork his health had rapidly been failing for the past two years, and although he had tried hard to pull himself together, he felt it impossible for him ever to recover. On the night of June 28, 1911, in a moment of mental aberration, he took his own life in his private office. He left a note as follows: "My nerves are gone. I have tried hard for two years to get well, and I find I am getting worse every day. If this keeps up, I will be unfit for anything. I cannot stand up under this strain any longer."

His widow, Bertha C., a son, John Quincy, Jr., a daughter, Mary Anna, of Indianapolis, his mother, Anna, a sister, Anna D., of Irvington, and his brother, P. M. Byram of Camden, Arkansas, survive him.

Respectfully submitted,

WILBUR F. LITCH, *Chairman.*

Dr. H. L. BANZHAF presented the report of the National Educational Council, which was received and ordered printed in the Transactions—as follows:

Dental Educational Council of America.

Annual Report of the Secretary, HENRY L. BANZHAF, B.S., D.D.S., Milwaukee, Wis.

The articles of organization of the Dental Educational Council of America adopted at Denver in July 1910 provide that the secretary shall receive the reports from all committees, and based on these reports shall prepare an annual message to the Council for its consideration. The Executive Committee gave special consideration to this matter, and after some deliberation decided that it would be best to present what may be termed an historic review in addition to the report on what has been accomplished during the year.

This report is not written on the theory that it contains the last word about dental education, neither is it intended to suggest that we have solved every problem, but your secretary will submit facts regarding conditions as they were found to exist after a somewhat brief inquiry.

HISTORY OF ORGANIZATION.

For the past two years there seems to have been a misconception in the professional mind as to what the Council is, how it was organized, what its powers are, and what it is trying to accomplish. Then, too, there has been but a limited opportunity of giving publicity to the work of this organization. The first move toward the organization of this body was made in August 1909, at Old Point Comfort, Va., when pursuant to a call issued by two committees representing the National Association of Dental Examiners and the National Association of Dental Faculties a meeting was held at Hotel Chamberlain. Those present were: For the N. A. D. E.—Chas. P. Pruyn, Wm. C. Deane, S. C. A. Rubey, Geo. E. Mitchell, and B. Rutledge; for the N. A. D. F.—J. P. Gray, Wm. Carr, W. E. Grant, D. J. McMillen, and Henry L. Banzhaf.

All who attended were called upon to speak, and it was the consensus of opinion there expressed that it was high time that these two great national bodies should join forces in deliberation and action on a basis of mutual confidence and respect. It was held also that instead of each body working alone, both bodies should work together for the uplift of dentistry and dental education.

It was first thought that it would be wise to organize a council on dental education after the pattern of the council on medical education of the American Medical Association, but after some discussion it was agreed that, in order to make the then proposed organization more representative, the National Dental Association should be invited to co-operate. Accordingly the secretary was instructed to invite Dr. Burton Lee Thorpe, president of the N. D. A., to appoint a committee of five members to represent this association in the organization of this Council.

A committee was also appointed to draft articles of organization, and instructed to report at the next annual meeting, to be held in Denver. During that year nothing was done except to prepare for the next annual meeting. It must be remembered that there were no funds provided, and that the original charter members did not meet again until July 20, 1910, at the Hotel Savoy, Denver, Colo. At this meeting the following appointments were reported by President Thorpe as representing the N. D. A. on this Council: J. V. Conzett, Louis Meisburger, A. R. Melendy, Richard Summa, and Howard E. Roberts.

The Committee on Organization, consisting of the president and secretary, made its report, which consisted of articles of organization for the government of the "Dental Educational Council of America." After the report of the committee had been fully discussed and some changes had been made in it, the articles of organization were adopted section by section and copies ordered printed for distribution—which has been done. These articles declare that the object of this organization is the advancement of dental education and the unifying of the standards of the various national bodies of the dental profession.

PURPOSE AND PLAN OF THE ORGANIZATION.

From the many inquiries received by your secretary it would seem that some good men thought that there was something else behind this simple declaration of fact, and it may be well to state at this time, especially for the benefit of the profession at large, that it was never intended that this organization should surround itself by a high wall of protection, or, in other words, that its plan was to protect the dental colleges specifically in anything that it might find weak or amiss in their system of education. On the contrary, it was the general belief expressed by the men present at the Old Point Comfort meeting that there were some things wrong with dental education, that dental colleges and state boards did not understand each other very well, and that by reason of their limited interchange of views these organizations were drifting farther apart instead of coming nearer together. It was found that the profession at large was interested in spots, but generally speaking there was apathy, lack of interest, and distrust of dental education as developed in this country. It was very gratifying, therefore, to the friends of this organization, when Dr. Burton Lee Thorpe, the president of the N. D. A., in his "President's address" placed the stamp of his approval upon the general purpose and plan of this organization. Among other things he said:

"In April [1910] your president was asked to appoint five members to represent the National Dental Association to co-operate with five members each of the National Association of Dental Examiners and the National Association of Dental Faculties in creating the "Dental Educational Council of America," the object of which is the advancement of dental education and the unifying of the standards of the various national bodies of the dental profession; to inspect the various colleges under their jurisdiction with a view of ascertaining the character of the work done, and whether the needs of the communities in which colleges exist are fully satisfied; to perfect a model curriculum and make a study of the existing dental laws of the various states, and present a report on the possibilities of more uniform dental laws. Your president selected Drs. J. V. Conzett, Richard Summa, Louis Meisburger, Howard E. Roberts, and A. R. Melendy to represent the N. D. A. on this Council, with the hope that they may assist in bringing about the ideals proposed, which will result in giving our schools a higher standing and placing our profession where it rightly belongs."

This did a great deal of good, because it made it clear that this great national body of dentists was willing to carry its share of responsibility in such an undertaking. At subsequent meetings of the Council during this session it was urged that the Council should study the problems of dental education as any commission would undertake to study any problem committed to it. It was decided also that the Council was to have advisory powers only.

The work of this Council was delegated to three committees, namely, the Committee on Uniform Dental Legislation, the Committee on Curriculum, and the Committee on Colleges.

REPORT OF COMMITTEE ON COLLEGES.

On account of lack of funds the Committee on Colleges has not been able this year to do all it had hoped to accomplish, and has had only one meeting during the year. The committee has, however, applied itself conscientiously to the task set before it, as the following report of the chairman, Dr. W. E. Grant, will show:

"The work undertaken up to this time by the committees from the various national bodies has not been satisfactory. They have been vested with but little authority for action, and many changes have been made on the committee each year, so that the short period was not sufficient time to enable them to become familiar with the immense amount of detail and complex problems presented by the colleges, the state boards, and the state laws, which in many instances are at variance with each other.

"The question of entrance requirements, which has been before the national bodies for consideration for a number of years, still seems to be a very knotty problem, and one that demands careful deliberation and sane consideration. The fact remains that this preliminary educational requirement is one of the weakest parts of the dental educational system today.

"There are large sections of the country in which the opportunity for high-school training is very limited, and students could only

obtain such training at a considerable sacrifice of time and money. There are other sections in which this training is partially provided and in which the state authorities and recent state laws promise great improvement in the next few years. These things being true, it appears that we must regulate our entrance requirements to a plane that can be reasonably maintained in all sections. We appreciate that it will be folly to make rules and regulations—as has been done in the past by these national bodies—without providing for their enforcement.

"There is a great variance in the opportunities offered the dental student that must receive attention. Thus as to the lack of technic laboratory instruction and the entire absence of any equipment or facilities for instruction in the pure science branches, and the woful neglect of practical and laboratory instruction, the equipment necessary to enable a student to properly do clinical work, insufficient clinical material, and the absence of competent demonstrators—the state boards of our country are complaining particularly of these matters, and from general observation on the part of the committee, we believe this should be remedied at once.

"We must take up the important task of a personal inspection of the dental colleges of the United States to ascertain the exact character of their work and to make a classification of them. While the committee have not had the funds at their disposal to enable them to undertake this work in the manner desired, about half of the schools have been looked over during the past year in a general way, and the result of this examination impresses the committee with its importance.

"We have now reached a time in dental educational matters in this country when a fair and full understanding as to reasonable requirements for dental colleges is absolutely necessary, and inspection made to see that these reasonable requirements are fully enforced. It is the purpose of the committee to try to work out all irregularities now existing and to settle those difficult problems which are likely to arise from time to time.

"In order to carry on this work a permanent organization with permanent headquarters and funds to meet the traveling and clerical expenses is absolutely necessary. It is not only necessary to look after a large amount of correspondence and statistical work, but, after collecting the same, the facts must be disseminated, so as to obtain the best results.

"This organization can have no legal powers. Such powers must rest entirely in the hands of the state licensing boards. It is clear that the collection of this information is a necessity. It is also clear that the publicity given to this information will be of great service in securing needed reform. Your committee feels that we cannot too forcibly present the importance of universal co-operation in this work of the Council.

"The national organizations must support this work in every sense that the word support can be used, and in addition, the individual state boards,. state and local societies, and colleges, must be free in rendering whatever assistance may be asked of them or they in their wisdom think good to offer.

"It is within the power of the national dental organizations, the state boards and state societies, the colleges, and the dental profession of America, to put dentistry on a high and acceptable plane. Co-operation in the Dental Council work should be the watchword, to produce results."

PRELIMINARY EDUCATIONAL REQUIREMENTS.

It appears that the weakest spot in the dental educational system at the present time is the certificate issued by the state superintendent of public instruction or his deputy showing that the applicant has an education equivalent to that obtained in four years of completed work in an accredited high school, which is accepted by dental colleges in lieu of a high-school diploma. The difficulty seems to be that dental examiners have many different conceptions of what their duty really is in admitting students to our colleges.

A goodly number appear to believe that persons who present themselves for admission to dental colleges who have never attended a high school, and whose preliminary education is limited to the training received in the elementary school supplemented by training in business colleges and correspondence schools, and life experiences, should be admitted on passing an examination largely perfunctory in character. Some examiners require written examinations in a few subjects, others are satisfied with oral examinations of varying lengths and varying degrees of thoroughness. Persons of this kind who have been admitted to our dental colleges in the past have naturally failed to get the greatest benefit out of their dental college

course because they have not had a proper foundation for the work.

Dental examiners should construe the term "equivalent education" to mean what it is supposed to mean—a high-school education in fact. We should practice what we preach, and if we are on a high-school basis for admission to our colleges, only high-school credits should be accepted.

In case an applicant does not have the necessary high-school credits attested to by the proper high-school authorities, the dental examiner should give written tests in additional high-school subjects, and the answer papers together with the original high-school credentials should be preserved.

The Committee on Colleges has not been able to systematically visit dental schools, as has already been pointed out. The questions which were sent out to all dental colleges in this country were answered only by half of them, so we can only guess what the other half are doing. Some of these colleges may be doing good work and possibly refused to answer our questions because they were indifferent, and some of them probably did not dare to answer them. The committee believes that only schools that can demonstrate their right to exist as institutions of learning and which are laboring in the interest of higher dental education should be supported by the people. A logical conclusion, therefore, is that dental colleges which are on a purely commercial basis should not be supported by the people, and that just as soon as this fact can be established by evidence which will hold in a court of law, recognition should be denied such schools by all state boards of dental examiners that work under what may be called a "modern dental law."

We should prevent the possibility of a student who has never attended a high school or an institution of learning of similar grade securing from a dental examiner a certificate, based upon a written or oral examination consisting of two or three hours, showing fourteen or sixteen units of high-school credits. It is safe to say that the friends of higher dental education are not willing to admit that we have reached a point in this country where it is necessary that dental colleges, in order to maintain the necessary standard of attendance, should be allowed to admit students in this manner. If our colleges are on a high-school standard of admission, then this should be carried out in good faith, and if we are not, then it would seem to be far better, certainly far more honest and honorable, to look at conditions as they are, and adopt a standard that all can live up to. Educational values are of more importance than hide-bound rules which are not only obsolete and are not adaptable to our present-day needs, but which are "honored more in the breach than in the observance."

PROPOSED PROCEDURE FOR ADMISSION OF STUDENTS.

With this idea in mind, your Secretary would recommend the following procedure for the admission of students to dental colleges for your careful consideration:

First. That colleges require 14 units of high-school credits for unconditional admission.

Second. That after December 31, 1911, no dental school shall admit a student who has not 10 units of high-school credits, 8 of which were obtained by regular attendance at a high school or school of equal rank, and that each year, for two years thereafter one additional unit be required until the minimum requirement for admission shall be either 12 units of original high-school credits, or in lieu thereof 8 units of original high-school credits and 4 units of credits given by an examiner as a result of a written examination upon strictly high-school branches, and that all dental examiners should preserve the question-and-answer papers until after a student has been graduated.

The minimum requirement for admission of 12 units of original high-school credits allowing the student the privilege of making up only 2 units of high-school credits should be reached as soon as possible. When this has been done this standard will be in accord with the Denver resolution adopted in July 1910. This requirement must not interfere with any school maintaining a higher standard.

Third. That no student be admitted to a dental college except on a certificate issued by a dental examiner, this to be issued in

triplicate, one for the student, one for the examiner, and one for the dean of the college.

Fourth. That there be two kinds of certificates, unconditional and conditional. The nature of the unconditional certificate is self-explanatory; the conditional certificate shall explicitly state the credits upon which a student was admitted.

Fifth. That no student shall be graduated by a dental college until he has presented to the dean an unconditional certificate of admission.

Sixth. That all state boards require of each applicant for admission to the licensing examination that he present an unconditional certificate of admission to a college, together with all high-school credentials issued by high-school authorities, and the question-and-answer papers written at examinations given by the dental examiner upon which the issuance of the unconditional certificate was based, besides his diploma of graduation from a reputable dental college.

Seventh. That if the Committee on Colleges cannot visit the schools in order to personally examine conditions existing there, then the dental examiner for each dental college should send to the committee, not later than December 31st of each year, the original credentials for each senior student, together with the question-and-answer papers written at examinations given by the dental examiner.

Thus it may be seen that it is possible not only to check up the work of dental colleges, but it is also possible for state boards to have an efficient check on the work of the dental examiners. By means of the method outlined above, or some other, the entrance requirements of dental colleges in the United States could be placed on a uniform basis which would command the respect and support of not only the dental profession, but the public at large. Americans are all pretty much alike, and it would not be difficult for us to get together when once we understand one another. The old attitude that prevailed among educators some years ago, that the secret working of the system should be withheld, is out of fashion. The dental profession generally, as well as the people, have a right to know what is going on in our dental colleges. The examining board in every state where there is a dental college should be taken into the confidence of the college, and they should work together in all that is done. Let the profession, the state boards, as well as the colleges, continue the study of our problems and have all matters as they are fully explained, and it will follow that the attitude of distrust and suspicion, and the belief that conditions are far worse than they really are, will disappear—provided, of course, that all men honestly apply themselves to the task of elevating our dental educational system. The exercise of more care in the discharge of the administrative function of a dental college must be the first beginning, and even though mistakes have been made, intentionally or unintentionally, this should not be regarded as sufficient cause to despair of the future.

The dentistry of today is the splendid profession that it is because of the achievements of our honest progressive educators, and there is no warrant for placing honest dental colleges in the same class with those which are dishonest, and this has too often been done. In the future, let us hope, it will not do to point with pride simply to a specially designed building with modern equipment for dental teaching, a well-planned curriculum of study, a high-grade faculty of teachers, and a loyal and successful alumni body. We must have a more rigid enforcement of entrance requirements and exercise greater care in advancing students to higher classes in our colleges. If this is done, many of the standing rules of the N. A. D. E. and the N. A. D. F. will no longer be necessary, because the administrative and educational function of our dental colleges will have been honestly met, and mutual confidence not only will return, but will remain with us.

BROADER INTERPRETATION OF RULES ADVOCATED.

The matter of granting advanced standing to students by the deans of colleges should be put upon a broader educational basis which is in keeping with modern and advanced thought. Colleges should be given more latitude to interpret this for themselves, and in accordance with their rules. Colleges should be allowed to confer degrees at other than the specified time of each year. This regulative rule is nothing short of a

hobble which in no way makes for efficiency. There is no justice in keeping a student a year who has failed in one or two branches, and which failure could be made up in two or three months, or one semester at the most. In this matter as well as in the matter of conferring honorary degrees, colleges should be permitted to use their inherent discretionary power. A negative rule in these matters hinders the proper progress of education, and ofttimes needlessly robs students of time that might be devoted to beginning their life-work as early as possible.

In most states there is a law which requires the state board to admit to its licensing examination only graduates of a reputable dental college. Therefore, if the rule which is now in existence, and which forbids the conferring of honorary degrees were abrogated, there would be very little chance of abuse of such power, but it would give institutions of learning the right to confer an honorary degree upon men who entered our profession many years ago and who by their efficient services have merited this distinction.

Let us throw back the shutters, open the windows, and let the light of progress and knowledge shine in. Let us stop feeding ourselves "baled hay," and partake freely of truth and wisdom as applied to modern dental education to the end that the work of the teacher will be represented by the impress of one personality upon another, and will be the revealing of an enriched personality to the student, for the benefit of humanity.

FINANCIAL STATEMENT.

(Aug. 18, 1910—July 18, 1911, inclusive.)

Receipts.

National Dental Association	$50.00
National Association Dental Faculties	50.00
National Association Dental Examiners	50.00
Kentucky State Dental Society	25.00
Philadelphia Dental Societies, by Dr. H. E. Roberts	30.00
Dr. Wm. Carr, New York, personal	25.00
Pennsylvania State Dental Society	25.00
Massachusetts State Dental Society	25.00
Missouri State Dental Society	25.00
Tennessee State Dental Society	25.00
Brought forward	$330.00
Wisconsin State Dental Society	25.00
Illinois State Board of Examiners	25.00
Pennsylvania State Board of Examiners	10.00
Massachusetts State Board of Examiners	10.00
Wisconsin State Board of Examiners	10.00
Total receipts	$410.00

Disbursements, as per vouchers.

Aug. 1909 to July 15, 1910—printing, stenographic services and petty cash	$41.60
Abbie Brown, stenog., June 1910—August 1911	45.38
Evening Wisconsin Co., printing letter-heads, envelopes, Articles of Organization, and postal cards	44.25
Postage	2.34
Postage on stationery sent to all Council members	.72
Postage on correspondence	1.34
Expressage	1.69
Long dist. tele. to Dr. Pruyn	1.65
T. S. Gray Co., supplies	5.03
H. H. West Co.	4.37
I. X. L. Letter Co., circular letters	4.75
Postage on letters sent out regarding Cleveland meeting of Council	4.60
R. Keogh, stenographic services	15.00
Dr. W. E. Grant, stenog. and clerical	39.90
Exchange West Side Bank	2.25
Total	$214.87

Receipts	$410.00
Disbursements	214.87
Cash on hand	$195.13

HENRY L. BANZHAF, *Sec'y-Treas.*

Note.—The foregoing Report of the Secretary was received by the Dental Educational Council and referred to the committees on Curriculum and Colleges, to come up for consideration at the meeting of the Council to be held in January 1912.

On motion, members representing the N. D. A. upon the Educational Council were reappointed, and $50.00 was appropriated toward the expense of that council.

On motion, adjourned to meet at 3.30 P.M.

Third Session.

The meeting was called to order at 3.30 P.M., with the following members present: Drs. Burkhart, Gaylord, Smith, Peck, and Brown.

The following resolution was adopted:

RESOLVED, That the Executive Council recommends that a committee of three be appointed by the president to act as solicitors for funds for the care of members of this association who may need financial aid, and that the Executive Committee is authorized to contribute to this fund every year such sums of money as they feel can be judiciously spared, and that the treasurer is authorized to pay from this fund such orders as may be drawn upon him by the unanimous vote of the committee; and be it further

RESOLVED, That the surplus of the amount subscribed for the relief of the California dentists be used as a nucleus for this fund, and that the disbursements shall conform to the restrictions of that gift.

On motion the Treasurer is required to furnish a surety company bond in such sums as the Executive Council may require from time to time, the expense of said bond to be paid by the association. On motion the bond required of the treasurer for the coming year was fixed at $5000.

Dr. B. HOLLY SMITH presented a verbal report of the Miller Memorial Committee, and on motion it was recommended that the committee be continued and the subscription list be kept open.

Dr. M. F. FINLEY, chairman, presented the Pharmacopeial Committee's report, as follows, which on motion was received and ordered printed:

REPORT OF PHARMACOPEIAL COMMITTEE.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION.

In sequence to a request originating in the union meeting of the District of Columbia Dental Society and the Maryland State Dental Association, that the National Dental Association pass a set of resolutions calling on the department of Agriculture to make examinations of the dentifrices and mouth-washes now on the market, with an idea of publishing their true value and the justness of their advertised therapeutic claims—which resolutions were adopted at Denver last year—I have the honor to submit the following correspondence as a report covering the various steps and a final acquiescence by the department of Agriculture in meeting our desires as an association.

Respectfully submitted.

M. F. FINLEY, *Chairman*,
JOSEPH HEAD.

COLUMBUS, OHIO, November 9, 1910.

DEP'T OF AGRICULTURE, WASHINGTON, D. C.

Whereas, the National Dental Association is in session at Denver, Colorado, July 19–22, 1910; and

Whereas, it is of the utmost importance to the dental profession and the public at large that there should be full knowledge concerning the real worth and true ingredients of dentifrices and mouth-washes generally prescribed and used; therefore be it

RESOLVED, That the department of Agriculture at Washington be respectfully requested to undertake the analysis of the generally used dental preparations, with the purpose of publishing their findings for the guidance and instruction of the dental profession at large; and be it further

RESOLVED, That these resolutions be inscribed on the minutes of the National Dental Association; and be it further

RESOLVED, That the secretary be instructed to forward a copy of these resolutions to the department of Agriculture at Washington, D. C.

EDWARD S. GAYLORD, *President*,
HOMER C. BROWN, *Rec. Sec'y*.

WASHINGTON, D. C., November 26, 1910.

Dr. EDWARD S. GAYLORD, President N. D. A.

Sir,—I beg to acknowledge receipt of a copy of the resolutions passed by the National Dental Association at Denver July 19–22 in regard to the inspection of the various dentifrices and mouth-washes prescribed by physicians, dentists, and others. There is no doubt in my mind that these bodies all fall within the definition of drugs given in the law itself. It would give me pleasure to advise the bureau of Chemistry to secure samples of these various dentifrices which may be open to suspicion, for the purpose of ascertaining their composition and probable danger which may attend their use.

Respectfully,

JAMES WILSON, *Sec'y.*

WASHINGTON, D. C., December 1, 1910.

Dr. EDWARD S. GAYLORD, President N. D. A.

Dear Sir,—On the 26th ultimo the Secretary of Agriculture forwarded a letter to you to the effect that it would give him pleasure to advise the bureau of Chemistry to secure samples of various dentifrices which may be open to suspicion for the purpose of ascertaining their composition, and the probable danger which may attend their use. In order to facilitate the matter, I would ask that you forward to the bureau of Chemistry, at your earliest convenience, a list of the dentifrices which your association may have in mind.

Respectfully,

H. W. WILEY, *Chief.*

COLUMBUS, OHIO, December 21, 1910.

Dr. M. F. FINLEY, Washington, D. C.

My dear Doctor,—After the affairs of the secretary were turned over to me by Dr. Butler I found the resolutions offered by you relative to dentifrices and mouth-washes, and prepared same and forwarded to Dr. Gaylord for his signature, as the form presented made provision for this indorsement, and requested that he forward same to Washington. This he did, and mailed me the replies, which I herewith turn over to you, as I have taken this up with Dr. Gaylord and it is our opinion that you are the one to look after the matter, since you reside in Washington and are more familiar with the situation than others. Besides, you are chairman of the Pharmacopeial Committee.

Therefore, kindly assume charge of this, and we will all be confident that it will receive careful attention.

Very sincerely yours,

H. C. BROWN.

WASHINGTON, D. C., January 30, 1911.

Hon. JAMES WILSON, Sec'y of Agriculture, Washington, D. C.

Dear Sir,—Your letter of November 26, 1910, to Dr. Edward S. Gaylord, New Haven, Conn., relative to action taken by the National Dental Association for the examination of various dentifrices and mouth-washes by the bureau of Chemistry, was referred to me, also a letter to the same party from Dr. Wiley, chief of the bureau of Chemistry.

I have supplied to the bureau of Chemistry the list of dentifrices that it is desired should be examined for their purity and efficacy. Having been authorized to act for the National Dental Association in this matter, I desire to know what further steps it will be necessary to take to secure the publication of the results of the examinations made by the bureau of Chemistry of these various dentifrices than the request of the National Dental Association, which is hereby made so that not alone the people at large may be protected, but the dental profession also enabled to employ these agents with more security.

The National Dental Association is a delegate body of representatives from every state and territory of the United States. This association was admitted to membership in the U. S. Pharmacopeial Convention last May, in Washington, and it is interested to fulfil as many useful offices to the general public as possible; therefore, with the assistance of your great department of Agriculture, it is desired to ascertain the quality of these dentifrices for the general good of all concerned in their use.

I understand the American Medical Association is assisted in its desires along similar lines, and it is hoped you can see your way to granting this request of the National Dental Association that the department of Agriculture publish the results of the examination

of these preparations above referred to for purity and efficacy.

Respectfully,

MARK F. FINLEY, *Ch'man Com. for N. D. A.*,
1928 "I" st., N. W., Washington, D. C.

Calox should be tested for its oxygenating power and its grit, in addition to seeing what its ingredients are.

Sozodont should be tested for its ingredients.

Zhongiva should be tested for its ingredients.

Kolynos (paste and wash) should be tested for ingredients, to see if it is according to formula.

Sanitol (paste and powder) should be tested for ingredients.

Euthymol (tooth paste) should be tested for ingredients.

Colgate's should be tested for ingredients.

Wampole's should be tested for ingredients.

Pebeco (chlorate of potash tooth paste) should be tested for ingredients.

College Tooth Paste and Orocide should be tested for ingredients.

Lily's Tooth Paste should be tested for ingredients, to see if it is according to formula.

Lyon's Tooth Powder should be tested for its ingredients, and for its grit particularly, as this powder is particularly under suspicion of cutting teeth badly.

Listerine, Glyco-thymoline and the *Peroxids* should also be tested for their ingredients. The peroxids for the amount of oxygen and the amount of free acid and the kind of free acid, because some acids cut teeth much more than others.

If you wish to investigate *Dentigen,* it should be investigated for its ingredients and its oxygenating power. Therapeutically, we find most excellent results from it.

[This list was carried in person to Dr. Kebler, at the bureau of Chemistry, January 12, 1911.—M. F. F.]

WASHINGTON, D. C., February 17, 1911.

Dr. MARK F. FINLEY, Chairman, etc., Washington, D. C.

Dear Sir,—Your favor of January 30th at hand, and in reply desire to state that the bureau of Chemistry is now investigating certain dentifrices, and will add to the list at present under investigation. As soon as this investigation is completed the results will be published in bulletin form under the same conditions as have prevailed in the past relative to such products.

Respectfully,

M. M. HAYES, *Acting Sec'y.*

Dr. CHAS. W. RODGERS, chairman of the Committee on Low Patent, made a report, as follows, which on motion was received, the committee's recommendations approved, and the report ordered printed:

REPORT OF COMMITTEE ON LOW PATENT.

Gentlemen,—The Committee on Low Patent begs leave to make the following brief report:

There has been no change in the status of the matter since the last annual meeting. The bill is still before the Patent Committee of the Senate and your committee has reliable information that it will not receive favorable action by that committee. Your committee suggests that a Patent Committee of three be appointed to take charge of all patent legislation, and that they be instructed to memorialize Congress to enact such legislation as will not permit the granting of process patents on any method which has to do with the healing art of medicine and dentistry, except such as can be manufactured and placed on the market for sale.

C. N. JOHNSON,
EMORY A. BRYANT,
CHAS. E. KOCH,
CHAS. W. RODGERS, *Chairman.*

On motion the Council adjourned to meet at the Hollenden Hotel at 10.30 Thursday morning.

Fourth Session.

The Council met in room 201, Hollenden Hotel, at 10.30 A.M., July 27th, and was called to order by Chairman Burkhart, with all members present.

RECEIPTS.

Balance on last settlement	$1,830.90	
Received from dues	2,750.00	
" " " Southern Branch, pp. 144 to 147	256.00	
		$4,836.90

DISBURSEMENTS.

A. R. Melendy, Treasurer, salary and exp.	$289.45
C. S. Butler, Secretary, salary	400.00
Dental Cosmos, postage Transactions	95.02
Matthews-Northrup Co., printing	418.61
H. C. Brown, Correspondent	132.75
Fred L. Leport, reporting Fourteenth Annual Session	150.00
F. O. Hetrick, Clinic Committee	254.65
B. L. Thorpe, President, exp.	25.00
C. S. Butler, Secretary	96.00
B. L. Thorpe, Fifth Int. Congress Committee	21.43
Richard Summa, section	5.00
Wms. Donnally, Legislative Committee	135.00
C. W. Rodgers " "	39.00
Smith-Brooks Print'g Co., extra clinic progr.	40.00
H. C. Ferris, Research Committee	96.00
W. G. Ebersole, Oral Hygiene Committee	244.53
W. H. DeFord, Legislative Committee	1.30
H. C. Ferris, Research Committee	57.00
B. F. Gray, section	7.00
E. R. Warner, Smith Photo. Co.	35.00
Henry L. Banzhaf, Dental Educational Committee	50.00
B. Holly Smith, Exec. Council meeting	25.00
C. L. Alexander, " " "	60.00
H. J. Burkhart, " " "	40.00
E. S. Gaylord, " " "	13.00
H. C. Brown, " " "	55.00
New Franklin Printing Co.	16.50
1910. Brought forward	$2,802.24
December 23d—	
Chas. S. Butler, Guerini's History	16.00
1911.	
March 15th—	
H. J. Burkhart, expenses to Washington	45.00
Buck Printing Co., return postals	5.75
March 18th—	
E. S. Gaylord, cablegrams, etc.	15.47
May 16th—	
S. S. White Dental Mfg. Co., postage, cartons, etc.	169.40
Journal Fund, $1.00 per member, 1911 (dues collected to July 19th)	230.00
	$3,283.86
Balance, Incidental Fund	1,553.04
	$4,836.90

SPECIAL RELIEF FUND.

Relief Fund, with interest to July 1, 1911	$4,317.49

JOURNAL FUND.

Balance from last report	$435.84	
Interest to July 1, 1911	17.58	
Received from Southern Branch, special contribution (in lieu of $1.00 per member for 1911)	250.00	
Amount from 1911, dues to July 19th ($1.00 per member)	230.00	
		$933.42
H. L. Wheeler, exp. Journal Committee		72.08
Balance Journal Fund		$861.34

Respectfully submitted,

A. R. Melendy, *Treasurer.*

Approved July 26, 1911: V. H. Jackson, M. F. Finley, H. B. McFadden,
Auditing Committee.

Dr. V. H. Jackson, chairman of the Auditing Committee, presented the Treasurer's report, together with such bills as had been presented to their committee up to that time, which were approved by the committee. On motion, the Treasurer's report was received and ordered printed. [See page 25.]

Dr. Herbert L. Wheeler presented the report of the Journal Committee, as follows, which on motion was received and ordered printed:

REPORT OF COMMITTEE ON DENTAL JOURNAL.

To the National Dental Association:

Gentlemen,—Your Committee on Dental Journal wish to report that under the resolution passed last year at Denver, creating a general fund, there has been accumulated, together with a fund for this purpose already in the treasury, about $800. As this seems insufficient to make a proper beginning in establishing a journal, and in view of the forthcoming probable reorganization of the association, we deem it inadvisable to begin the publication of the journal at this time. We therefore recommend that the Committee on Dental Journal be continued another year, with the expectation that upon the expected reorganization of the National Association it is presumable sufficient funds will be on hand to begin the publication of the journal.

Respectfully submitted,

J. D. Patterson,
C. S. Butler,
Burton Lee Thorpe,
Herbert L. Wheeler, *Chairman.*

Dr. J. D. Patterson, chairman of the Revision Committee, made a verbal report of the conference which the committee held with representatives from twenty-four state societies, and offered the following resolutions, which upon motion were adopted and recommended to the association for favorable consideration:

Resolved, That in accordance with the expressed wish of the state delegates to the meeting which considered the alteration of the Constitution, the National Dental Association will organize along the lines of the American Medical Association.

Resolved, That the draft of the Constitution, drawn in conformity with the above, be printed and forwarded to the state societies with the request that such as desire shall make application for constituent membership at the next meeting, stating how many members they can guarantee.

Resolved, That if properly supported by the state societies, the Constitution and By-laws will be finally revised and adopted at the next meeting, the same to take effect at the meeting of 1913.

Drs. L. L. Barber, H. C. Brown, and Joseph Head discussed the crowded condition of the program, and it was arranged for Section II to hold an extra session at 2.30 this afternoon, at which time Drs. Joseph Head and A. C. Fones would present their papers.

Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee, made a partial report, which was continued until the next session.

Dr. Burton Lee Thorpe called attention to the fact that action should be taken relative to arrangements for the International Dental Federation in the event that they should accept our invitation to meet in America. He suggested that the incoming president, recording secretary, and council be authorized to take full charge of necessary arrangements, appoint all committees, and transact all other business in order to make this meeting a success, and on motion it was so ordered.

On motion, all persons hereafter presenting bills to the association are re-

quired to attach vouchers covering the expense involved.

On motion, adjourned to 3.30 P.M.

Fifth Session.

The meeting was called to order by Chairman Burkhart at 3.30 P.M., with all members present.

Dr. W. G. EBERSOLE, chairman of the Oral Hygiene Committee, continued his report. There being no objection, the report was received and recommended to the association for adoption.

Dr. E. A. BRYANT appeared before the Council and read letters as evidence that the best terms that Congress would grant were obtained in the law just passed establishing a commissioned army dental corps, with historical facts relating to the recent legislation.

Dr. C. W. RODGERS, secretary of the Legislative Committee, filed its report, as follows, which on motion was received, and the recommendations in the last clause recommended to the association for approval:

REPORT OF THE COMMITTEE ON ARMY AND NAVY DENTAL LEGISLATION.

TO THE OFFICERS AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION:

Your Committee on Army and Navy Dental Legislation have the honor to report that the prompt appointment of a small and harmonious committee at the Denver meeting, and the clear lines laid for its guidance, were material factors in the attainment of important results.

The first important result attained was a strongly favorable report by the House naval committee, published as H. R. Report 1740, 61st Congress, and dated December 7, 1910. The bill reported, known then as H. R. 26,189, and now as H. R. 761, is the three-grade measure, the consent to the terms of which was obtained by your committee from the Navy department in the early months of 1910, and was approved by this association, urgently and emphatically, at the Denver meeting. The chairman of the Senate naval committee announced on the floor of the Senate the approval of his committee of the terms of this bill.

Diligent effort was made by your committee, through many of our friends in Congress, to obtain final consideration of this bill by the 61st Congress, but the continued opposition of a senator from Maine, together with the peculiar parliamentary situation and the changing political phases of the Congress, prevailed against it.

With the opening, April 4th, of the special session of the 62d Congress, Senator Perkins, chairman of the Senate naval committee, again offered this bill, as Senate 290, and Representative Roberts of Massachusetts did likewise in the House, where the bill is now known as H. R. 761.

As it is always required, when bills go over from one Congress to another, the new Congress submitted this bill to the Navy department for its further consideration and views, whereupon the Navy department renewed its recommendation in stronger and more emphatic terms.

It would seem that there could scarcely arise a doubt as to the passage of this bill, without a change as to the number of grades for which it provides and in the recognition of dentistry which it would thereby imply, but we should not be unmindful of the strong influence and prejudice created by the establishment of a precedent such as that fixing the rank of the army dental service at the lowest grade to which staff officers are appointed.

We should therefore renew with all possible vigor our contention for three grades of rank for dental surgeons to be appointed to the navy service, and all our activity, energy, and resources should be directed to the accomplishment of this end. Hence, we strongly urge the immediate appointment of the Legislative Committee, and the approval of the lines heretofore successful in promoting this bill—which, now thoroughly organized, are available for continuing the work.

In urging the National Association to earnestly and emphatically insist on the provision for three grades of rank for the navy

dental corps we are but following the policy that you and your committee have pursued for ten years, which policy was strongly approved by the Senate military committee and a very large majority of the senators, as well as by the House military and naval committees and a large majority of the representatives in Congress. Therefore, the only need is that this policy should be unanimously supported by the profession and backed up by those who have any authority to speak for the National Association. Its passage early in the next session of Congress is indicated by the attitude of both the Senate and the House naval committees and by the Navy department's consistent adherence to the three grades of rank to which it is committed by the recommendations made to the 61st and to the 62d Congress.

The Army Dental Act of March 3, 1911. While the result of our efforts is not as creditable a recognition of the dental profession, not as generous to its representatives in the military service, nor as beneficial to the army *personnel*, as we sincerely desired and labored to attain, yet it is a decidedly notable and important legislative uplift of the profession's representatives in the United States army service, from the nondescript and odious "contract" position to that of a grade of regular military rank common to all staff corps.

There are several other classes of civilians in the military service for the commissioning of whom long and strong contention was made, but the dental profession was the only profession whose efforts for the commissioning of their representatives in the army service was successful.

Finally, it is recommended that hereafter the President and Recording Secretary under the seal of this association notify the War department, the Navy department, including the bureaus of Medicine and Surgery, of the names of the Committee on Army and Navy Legislation, as soon as appointed.

Respectfully submitted,

WM. CRENSHAW, *Chairman,*
W. H. DEFORD,
CHAS. W. RODGERS, *Sec'y Com.*

On motion the Council adjourned to meet at Engineers' Building at 10.30 on Friday morning.

Sixth Session.

The Council met in the committee room of the Engineers' Building at 10.45 A.M., July 28th, with Drs. Burkhart, Smith, Peck, and Brown present.

On motion, Drs. C. B. Warner, Chas. S. Butler, and B. Holly Smith were appointed a Committee on Publicity.

The Executive Committee reported that they had organized.

Dr. JOHN S. MARSHALL addressed the Council on the advisability of placing some restrictions upon the privileges extended by the association to non-members.

Drs. Chas. S. Butler, Burton Lee Thorpe, and Henry A. Kelley addressed the Council on the question of the association's having more direct supervision over the arrangements for the meetings, and especially with reference to the exhibitors. On motion the Executive Council recommends—That for the next annual meeting the Local Committee of Arrangements be directed to have no official connection with the dental exhibits, and that all arrangements for the meeting be absolutely under the direction of the Executive Committee.

On motion it was recommended that for the next annual meeting papers shall be limited to thirty minutes in length, those selected to open discussion to ten minutes, and general discussion to five minutes each.

The Executive Council also recommends that one day shall be devoted to clinics, that day to be the last one of the session.

The following bills were presented, and on motion were ordered paid, funds in hand permitting:

H. J. Burkhart, expense Cleveland meeting in May	$20.00
D. O. M. LeCron, expense Clinic Committee	431.35
A. R. Melendy, Treas. salary and expense	295.45
H. C. Brown, Rec. Sec'y salary and expense	577.60
H. C. Brown, expense Sec'y Revis. and S. & L. So. committees	76.50
L. L. Barber, expense 1910 and 1911, chairman Section II	25.00
Franklin Printing Co., general printing and programs	380.17
Chas. McManus, flowers (Mrs. Gaylord's funeral)	15.00
A. O. Ross, expense Sec'y Clinic Committee	22.08
M. B. Ferris, stenographer Revision Conference	4.00
M. F. Finley, expense Pharmacopeial Committee	4.10
Wms. Donnally, legislation expenses	353.40
Chas. W. Rodgers, expense Corresp. Sec'y and Legisl. Com.	73.00
Wm. Crenshaw, expense Legislative Committee	63.40
Henry C. Ferris, expense Research Committee	271.58
W. G. Ebersole, expense Oral Hygiene Committee	220.40
J. P. Corley, expense Oral Hygiene Committee	96.00
H. C. Thompson, expense Oral Hygiene Committee	25.00
Conrad H. Syme, legal service	25.00
W. R. Clack, expense Clinic Committee	2.04

On motion the proceedings were given to the *Dental Cosmos* under the same arrangements as heretofore.

REPORT OF THE CREDENTIALS COMMITTEE.

The Credentials Committee reported that the following had presented proper credentials and were admitted to permanent membership:

Chas. F. Ash, New York, N. Y.
Chester A. Baker, Washington, D. C.
C. J. Barris, Washington, Ind.
J. W. Barnett, Little Rock, Ark.
H. M. Beck, Wilkes-Barre, Pa.
Wm. O. Beecher, Waterbury, Conn.
W. D. Beckwith, Waynesboro, Ga.
J. R. Bell, Cleveland, Ohio.
Jos. L. Bellefleur, Salem, Mass.
J. R. Bernheim, Dental Corps, U. S. Army.
J. Harvey Blain, Prescott, Ariz.
J. A. Bothwell, Toronto, Can.
Walter J. Boydston, Fairmont, W. Va.
Fenton Bradford, Washington, D. C.
Earle S. Braithwaite, Chicago, Ohio.
Geo. Bridgeman, New Martinsville, W. Va.
King Brooks, Lexington, Ky.
G. L. Brunk, Elida, Ohio.
Russell W. Bunting, Ann Arbor, Mich.
O. W. Burdats, Wheeling, W. Va.
W. J. Burridge, San Francisco, Cal.
Alden Bush, Columbus, Ohio.
C. R. Butler, Cleveland, Ohio.
W. A. Capon, Philadelphia, Pa.
D. S. Caldwell, Charlotte, N. C.
W. E. H. Caldwell, Wheeling, W. Va.
Edgar W. Carson, St. Louis, Mo.
W. J. Charters, Des Moines, Iowa.
R. A. Chattin, Richmond, Ind.
D. C. Clark, Blacksville, W. Va.
Louis D. Coriell, Maryland.
A. R. Cooke, Syracuse, N. Y.
I. W. Copeland, Ashland, Ohio.
J. H. Darling, Lake Preston, S. D.
L. C. Davenport, Fargo, N. D.
H. D. Dawson, Washington, D. C.
W. D. DeLong, Reading, Pa.
W. C. Dennis, Jackson, Miss.
Edmond J. Donnegan, Scranton, Pa.
Chester W. Dorsey, Bellevue, Ky.
T. E. Dougherty, Guthrie Center, Iowa.
J. K. Douglas, Sandusky, Ohio.
James E. Dowden, Fairmont, W. Va.
Wm. S. Eisenhart, York, Pa.
Samuel W. Fahrney, Chicago, Ill.
H. J. Frank, Chicago, Ill.
R. B. Gage, Cleveland, Ohio.
G. M. Galloway, Spencer, W. Va.
C. M. Gearhart, Washington, D. C.
John S. Geiser, Baltimore, Md.
Edward B. Griffith, Bridgeport, Conn.
Eugene H. Hall, Columbus, Ohio.
Gillette Hayden, Columbus, Ohio.
O. S. Heinemann, Cincinnati, Ohio.

Ellison Hillyer, Brooklyn, N. Y.
A. H. Hipple, Omaha, Neb.
Abram Hoffman, Buffalo, N. Y.
John G. Hogan, Bedford, Ind.
George M. Holden, Hackettstown, N. J.
B. Merrill Hopkinson, Baltimore, Md.
S. Oscar Howland, Gloucester, Mass.
R. R. Hutchison, Pittsburgh, Pa.
Walter G. Hutchison, Nashville, Tenn.
Chas. S. Jack, Philadelphia, Pa.
A. A. Jessup, Boise, Idaho.
J. Salgado Jimenez, Porto Rico.
W. I. Jones, Columbus, Ohio.
J. D. Jordan, Little Rock, Ark.
Grace E. Keith, Portland, Ore.
Otto U. King, Huntington, Ind.
Addison Kingsbury, Columbus, Ohio.
C. R. Lawrence, Enid, Okla.
G. D. Laymon, Indianapolis, Ind.
R. H. Leete, Prestonsburg, Ky.
E. Ballard Lodge, Cleveland, Ohio.
W. H. Lowell, Lancaster, Pa.
E. A. May, Jackson, Miss.
J. P. Marshall, St. Louis, Mo.
C. M. McCauley, Abilene, Texas.
John H. McClure, Wheeling, W. Va.
D. Hamilton McCoy, Buffalo, N. Y.
Wm. F. McKinley, Wheeling, W. Va.
C. R. Milam, Paducah, Ky.
T. M. Milam, Little Rock, Ark.
C. W. Mills, Chillicothe, Ohio.
J. J. Moffitt, Harrisburg, Pa.
Fred. F. Molt, Chicago, Ill.
C. H. Neill, Fairmont, W. Va.
A. W. Newell, Columbus, Ohio.
Jos. D. Osborne, Atlanta, Ga.
E. L. Pettibone, Cleveland, Ohio.
L. M. Pursell, Tippecanoe City, Ohio.
Hugo Rettich, New York City.
D. A. Rosenthal, Pittsburgh, Pa.
John F. Ross, Toronto, Canada.
C. A. Ruhlen, Mt. Gilead, Ohio.
Jos. Y. Sack, Kansas City, Mo.
B. A. Sears, Hartford, Conn.
Marion Secrist, Alpena, Mich.
W. H. Sedgwick, Newark, Ohio.
Chas. J. Sellors, Fredonia, Pa.
E. L. Shobe, Bartlesville, Okla.
W. A. Siddall, Cleveland, Ohio.
D. D. Smith, Sandusky, Ohio.
Edgar W. Smith, Little Rock, Ark.
W. P. Smith, Cleveland, Ohio.
W. G. Stevenson, Morenci, Mich.
John P. Stiff, Fredericksburg, Va.
Robert H. W. Strang, Bridgeport, Conn.
H. H. Streett, Baltimore, Md.
H. D. Sweinhagen, Napoleon, Ohio.
Chas. K. Teter, Cleveland, Ohio.
Wm. C. Teter, Cleveland, Ohio.
O. A. Thompson, Hillsboro, Ohio.
H. Elmer Trostel, York, Pa.
Ervin D. Ulsaver, New Rochelle, N. Y.
S. H. Voyles, St. Louis, Mo.
A. S. Walker, New York, N. Y.
L. C. Walker, Brooklyn, N. Y.
L. J. Walker, Grafton, W. Va.
J. H. Wallace, Omaha, Neb.
Geo. H. Walling, Machias, Me.
C. B. Warner, Urbana, Ill.
Clarence V. Watts, Des Moines, Iowa.
S. Merrill Weeks, Philadelphia, Pa.
T. L. Westerfield, Dallas, Texas.
J. G. Wherry, Elyria, Ohio.
E. O. Whipple, Olean, N. Y.
P. H. Williams, Ashland, Ky.
Harris R. C. Wilson, Cleveland, Ohio.
C. E. Woodbury, Council Bluffs, Iowa.
Frank L. Wright, Wheeling, W. Va.
Wilson Zerfing, Philadelphia, Pa.
L. L. Zarbaugh, Toledo, Ohio.

V. H. Jackson,
H. B. McFadden,
M. F. Finley.

There being no further business, the Council adjourned.

H. C. Brown, *Rec. Sec'y.*

President's Address.

By Dr. E. S. GAYLORD, New Haven, Conn.

FELLOW MEMBERS OF THE NATIONAL DENTAL ASSOCIATION, LADIES AND GENTLEMEN,—The statement made by your Local Committee at Denver last year was to this effect: Come to Cleveland, and we will show the largest attendance the National Dental Association has ever had, and also insure the greatest increase in membership. Looking over this vast assembly, I am convinced that the first proposition has been made good.

I am reminded of my hesitation in permitting my name to be presented for assuming responsibility of the affairs of this body for the ensuing year. The unanimous *viva voce* expression then, and the liberal support now, contribute more than I can express to my appreciation of the honor which it seemed your pleasure to confer upon me, and for which I desire to extend my grateful acknowledgment.

We convene today in this beautiful Forest City, nestled within the confines of New Connecticut, bearing a record of being sixth in size among the cities of the States, but having no peer in residential avenues, public and educational buildings, extensive parks, monuments, and, what is of especial interest to us, once the home of our lamented Atkinson.

These surroundings, including the superior facilities for our meeting and a program fraught with ideas of the best men in our profession, we hope may all prove an inspiration to those in attendance, so that this meeting shall become memorable in history.

It is not my purpose to enter into a lengthy discussion, but I would briefly call attention to subjects of more than passing interest.

INCREASE OF MEMBERSHIP.

For some years much thought has been given to the matter of placing this organization upon a basis that should make it a truly representative National body in fact as well as in name. Our present form of government does not attract the men whom we should enroll as members. For years we have struggled with a membership of less than one thousand, with a list of upward of thirty-five thousand to draw from. I know that I am voicing the minds of many when I appeal to the Committee on Revision to submit some plan at this meeting by which we may hope to largely increase our membership.

While the demands that are being made upon our specialty are ever increasing, the trend is toward commensurate progress, which can never rela-

the prime object of our work being the relief of human suffering. Difficult problems may present, but I have the firm conviction that they will be met in such measure as shall give conclusive evidence that we are equal to the task.

PUBLIC PRESS BUREAU.

The education of the public, we think, may best be brought about by the organization of a public press bureau under the direct auspices of this association. The time has arrived when, in the opinion of many, a movement of this kind should be inaugurated.

ORAL HYGIENE.

As the subject of Oral Hygiene is being so universally considered, I am of the opinion that we should recognize its value, and associate ourselves with the work of the Committee of One Hundred. This organization, being engaged in an effort through the Congress at Washington to establish a National Health Bureau, is so in harmony with our work that membership from this association, I believe, would prove a mutual stimulus.

RELIEF FUND.

I desire to revive a subject which has been previously suggested, but in my opinion has not received deserved attention.

Humanity is not immune from misfortune. Our older men have observed how frequently members of this association have become dependent upon others. I believe it desirable for this organization to take new steps toward the establishment of a relief fund, which shall be more available and shall be so conducted as to invite contributions, which, under prescribed management, shall become a source of material relief to unfortunate members.

ARMY AND NAVY DENTAL LEGISLATION.

It is gratifying to note the progress that has been made the past year by our Committee on Legislation, in securing the passage of an amended law raising the official status of the dental army surgeon to the commission rank of lieutenant. While this is not all we desire, we think there is reasonable assurance that continual effort on behalf of the committee will be rewarded by securing the desired naval appointments, so that both branches of the service may be protected.

At the meeting last year it was observed that the president had some difficulty in procuring a suitable gavel. Upon motion to procure a suitable gavel for future use, Dr. J. W. David, vice-president from the South, announced that he would furnish the president-elect, and all living ex-presidents, with a suitably mounted gavel made from Texas ebony. I take pleasure in announcing that Dr. David has fulfilled his promise, and your present incumbent in office has the preferment of being the first to wield the Texas ebony, which he esteems a high honor.

Before closing this brief address, I wish to express my deep sense of obligation for the evidence of interest and sympathy which I have recently received from so many of my fellow members of this association.

To our recording secretary, and to the chairman of the Executive Council, who have so kindly assumed the many duties incumbent upon the presiding officer, I express my sincere thanks.

The Evolution of Dentistry.

By SAFFORD G. PERRY, D.D.S., New York, N. Y.

WHATEVER explanation has been given by this religion or that of the origin of the universe, the fact is established that its development has been a gradual evolution from the simple to the complex.

THE UNIVERSAL LAW OF EVOLUTION.

This law applies to the formation of suns and planets from the nebulous matter of the stellar spaces, to the physical development of plants and animals on our earth, and to the evolution of man himself from the most primitive condition to his present high estate.

It is not possible to make a just estimate of man, his needs, his aspirations, and his possibilities, unless we take this wide view, and study his rise from abject barbarism to his present state of high civilization. Whether his first ancestor was a bacterium, an ape, or Adam matters not, since his development has been a rising evolution.

Reasoning from the known to the unknown, it is fair to assume that the law of evolution which is so apparent in historic time was operative in prehistoric time. Here, then, we have a broad generalization which we can trust implicitly in our endeavor to account for man in his present condition on the earth. And the evolution which has governed his general development applies to all his special activities; what we call civilization is the sum total of all of his activities.

It follows logically that, if we are to consider specially any one of his activities, we must do so being ever mindful of the law of evolution.

In no other way can we consider the development of dentistry. It is one of man's latest activities. There are some so broad-minded, so far-seeing, and so awake to its possibilities for good as to believe it to be one of his greatest activities.

Dentistry ministers to man's personal needs. He could live comfortably and reasonably happily without books, pictures, sculptures, music, railways, ocean steamers, trolley cars, automobiles, and aeroplanes, but he could not be comfortable and happy without the ministrations of dentistry, and herein lies the explanation of the marvelously rapid development of dentistry into a profession.

DENTISTRY IN THE PAST.

Quite as much as medicine and surgery, dentistry is based upon a universal

human need, and yet there is little to show that it had made progress in early historic times. Egypt, one of the oldest countries in the world, contributes among her records and relics but little to show that the art of caring for the teeth was known, and what little was known was practiced as a part of the science of medicine. Greece, with her high civilization, did little more, and medieval Europe did even less.

Assuming that dentistry has developed from human needs, this seems strange to us. It implies that teeth had developed in primitive perfection, and that the modern diseases to which they are subject had not yet come into existence, or that educated men were occupied with large affairs, such as building pyramids and temples, and perfecting great works of art.

Perhaps men's inventive faculties were not concentrated on the little affairs of life, as in this modern age, when nothing is too trivial for serious study. Or, it may be that in those early times the world was poor, and there was no financial inducement to encourage invention and advancement along dental lines. We know that in the present day most rapid advancement has been made in the great cities, where great wealth exists, rendering reward for unusual effort most certain.

In fact, it has been said that American dentistry acquired its great prestige in the world partly from the fact that it was practiced for the very rich, by a class of men who were encouraged to do their best, and who had the courage to charge for their work in accordance with its difficulty or its success.

But it is not my purpose to sketch the historical and chronological side of dentistry. I am more concerned with its present and its future than with its past, though I believe a study of its past will enable one to more justly predict its future. The study of its poverty in early days is interesting, but it bears no comparison with the interest that attaches to the study of its abundant wealth of the present day.

Guerini's statement is doubtless true, that the very little that was known of dentistry in very early times was closely associated with the little that was known of medicine. In fact, the reading of his "History of Dentistry" leads to the conviction that with the ancients there was no divorce between dentistry and medicine.

AMERICAN DENTISTRY PREVIOUS TO THE ESTABLISHMENT OF THE FIRST DENTAL COLLEGE IN 1839.

If there were time, the study of that period would afford abundant interest. Thus passing over many centuries would be of great interest, if more were known of the practice of dentistry in the period that preceded the establishment of the first dental college in 1839.

It would be a grateful task to learn more of the men who, working independently and in many instances in isolated localities, acquired a knowledge of dentistry that made the establishment of the first dental college possible. There was no professional feast already prepared for them, as is the case with the young students of today. They must have been thoughtful, observant, and self-reliant, and they must have found great delight in working in a field as yet so uncultivated, and one so rich in possibilities.

Let us hope that someone will feel interest enough to write a history of American dentistry during the fifty years

preceding the formation of the first dental college. It would cover a period nearly co-incident with the establishment of our republican form of government, and it would contain much that ought to be preserved to our profession. Even among its members who had achieved great distinction in the art of saving teeth, there was doubtless little knowledge of medicine and surgery, and this may easily account for the fact that dentistry was not recognized as a specialty of medicine.

It is not surprising that this recognition was withheld, since students who desired to become dentists found no special instruction in medical colleges, but had to enter the offices of dentists and serve their time, somewhat after the manner of the ancient trades and crafts. They achieved success as practical dentists in accordance with their agreeable manners, their knowledge of mechanics, and their skill in the art of filling or extracting teeth.

THE ESTABLISHMENT OF DENTISTRY AS AN INDEPENDENT SCIENCE.

The most earnest and progressive of them must have realized that they were developing a beautiful new art, but the time had not yet come for it to be generally understood that the teeth are a part of the human body, and closely related in health and disease to all its other organs. The earnest and far-seeing men who organized the first dental college were aware of this, but not so the rank and file of men who were called dentists. Nor did medical men at that time appreciate this. Had they been broad-minded and recognized the fact that the teeth, unlike other organs of the body, must always require mechanical treatment, and that what had thus far been done by dentists was a necessary preliminary, they might have opened their doors and welcomed us in to a higher knowledge of the human body, and dentistry then would have been accepted as a specialty of medicine. But would it have been wise? I believe not, for neither dentistry nor medicine were then ready for such close union.

To the thoughtful student of that period it must now seem evident that the advanced men who organized the first dental college could have taken no other course. The preceding conditions made such action inevitable.

A dental college independent of medicine and surgery *had to be.* In no other way could dentistry have been free to develop its mechanical and artistic side; in no other way could the art of filling and saving teeth have been made the very center of its system of teaching. It taught anatomy, a little physiology, and a smattering of medicine and surgery. It taught no histology, because histology was not yet known, and even medicine had little knowledge of it at that time. Schwann's doctrine of cells was not announced until that very year of 1839. Virchow's doctrine of "all cells from cells" was not given to the world until 1855, and Max Schütze's theory of protoplasm not until 1856. Bacteriology was not even dreamed of, Professor Lister's successful demonstration of the antiseptic treatment not being made until on the battlefields of the Franco-Prussian war in 1870 and 1871.

In its poverty of positive knowledge at that time, what could medicine have brought to dentistry that would have been specially helpful to it? Probably very little indeed! It would have helped to dignify it as a calling, to make it more

respectable in the eyes of the world, but it could have given only a very little of that special knowledge necessary to the saving of human teeth.

There was not a medical college in existence at that time the teaching of which would have added to the art of saving teeth. That first dental college demonstrated to the world its efficiency in teaching men to save teeth, and therein lay the reason for its success.

Its graduates demonstrated to the world their ability, in the narrow field of their choice, and no amount of scorn or neglect on the part of medical men could deprive them of the confidence and respect of those for whom they worked. To use a slang phrase, theirs was a real case of "being able to deliver the goods!"

RAPID ADVANCE OF OPERATIVE DENTISTRY INDEPENDENT OF MEDICINE.

From the formation of that first dental college to the present time the evolution of the dental art has been phenomenal. In no other department of human effort has there been a more astonishing advancement. I will not take the time to examine chronologically and in detail the separate steps by which this great progress has been made. Material enough could here be found for an interesting volume, though confined to the department of operative dentistry alone.

The use of gold foil and the discovery of its cohesive property, the use of the rubber dam, the separation of teeth in one way and another by which their lost contours could be restored, the use of matrices, the gradual improvement of plastic fillings, the making of crowns and bridges, the construction of artificial teeth—a beautiful art, the perfection of which ought to be the next sensation in our profession—the use of porcelain fillings, and greatest of all, the discovery of a way to make gold inlays, make a series of events of profound interest to our profession, and of supreme importance to the world at large. And all this advance on the operative side of our profession would not have been aided in any appreciable degree by connection with any medical college in existence.

In fact, if, in 1839, dentistry had been recognized as a specialty in medicine, and its corps of teachers had been a part of the faculty of a medical college, the question might properly be asked if this phenomenal advancement would have been possible. I think it would not have been, because the teaching would have conformed to the medical standard, and there would not have been the same liberty in seeking new methods in conformity with the new and special needs. Although deprived in the early days of the recognition and support of medicine, dentistry, by means of the brilliant attainments enumerated, "made good" to the public, and won its way independently to its present position.

DENTISTRY'S ADVANCE SIMULTANEOUS WITH MEDICINE IN PATHOLOGY, THERAPEUTICS, AND BACTERIOLOGY.

Thus far, in writing of the rise of dentistry from the establishment of the first dental college to the present time, I have purposely confined myself to a consideration of its operative side.

I wanted to show how it has won its way by its skilful methods in ministering to the needs of humanity, rather than by its knowledge of pathological conditions. No other specialty in the healing art has called into use such mechanical ingenuity, and in no other

department has there been shown such a delirium of delight in the invention of new instruments and the adoption of new methods as in the art of saving human teeth. But from the beginning, on what I will call the pathological side, there has been a corresponding advance of knowledge, though not in the same degree, because there has not been the same need. This advance is constantly bringing us nearer to the mother profession of medicine. Our use of drugs, if not as extensive, has been as intelligent and as effective.

The use of arsenic for the destruction of exposed pulps, begun in 1835, was a beneficent beginning in the art of saving pain, while the discovery of anesthesia by a member of our profession in 1844 was the greatest boon that has ever been conferred on humanity. The uses of cocain and the X ray in dental practice have been as intelligent as in medicine and surgery, and with probably greater benefit to the world.

The announcement by the present writer, in 1883, of his belief that the disturbances that occur at the apical ends of the roots of dead teeth, as well as the loosening of teeth in their sockets under certain conditions, are due to bacterial infections, marked the beginning of what has since been accepted as the correct viewpoint. And the suggestion made at that time that intestinal troubles were due to bacteria was confirmed five years later by the first operation ever performed for appendicitis, that being distinctly a disease of bacterial origin.

The publication of Dr. Miller's book on the "Micro-organisms of the Human Mouth," in 1890, confirmed all that I had claimed seven years before, and went a step farther in order to show the danger to the general health from these organisms. Today, micro-organisms are recognized as the greatest enemies of mankind, and it is beginning to be perceived that the sanitation of the oral cavity, the great gateway to the human body, is one of the most important functions that any profession has to perform.

The conception on the part of the authoritative members of the healing art that bacterial disturbances are the cause of most modern diseases is the most important one yet reached by man; and it is also the most hopeful one, because warfare is most effective when waged against an enemy that has been discovered, and whose life-history is known. And so it happens that these discoveries put upon our profession a tremendous responsibility, since we have charge of the oral cavity, which, as said before, is the gateway to the human body. This conception comes to us somewhat as a surprise, and after seventy-two years spent in perfecting the mechanical or operative side of our art, opens our eyes to the fact that, whether we wish it or not, we must assume the responsibility of an important specialty in medicine.

It seems clear to me that in 1839 the course of dentistry and medicine had to be separated. By the logic of events it seems equally clear that in 1911 they have to be united. Our special studies and our practical experiences fit us for the intelligent care of the oral cavity, and that fact alone will compel us to accept the responsibility of that care. The world demands it of us, medicine and surgery expect it, and we must accept it, and we should do so gladly, because we can do it well.

THE EVOLUTION OF DENTAL JOURNALISM.

Other factors have contributed to our development, some of them in a manner

peculiar to our profession. The supply houses have been very helpful to us in manufacturing our instruments and our devices. They have also been helpful in printing and distributing our literature.

I am not one of those made unhappy by the fact that our literature in the past has been given to the world mainly through the medium of the trade journals. To me the most vital thing has been the character of our literature, rather than the medium of its distribution. Papers well written, well edited, well printed, and accurately illustrated have intrinsic value, and I think our profession has been fortunate in having them widely distributed.

The oldest and most influential dental journal in existence has in the last fifty-three years produced fifty-three uniform volumes which form an encyclopedia of dentistry; and many other journals, though less old, have contributed in proportionate degree to the ethical and scientific development of our profession.

With the inexorable necessity of securing the ablest dentists to be found to preside over them, I am not alarmed for the future of our literature.

I know there are many who believe the time has come when we should entirely control our own literature. I appreciate and respect the feeling that prompts this, but journalism is a distinct profession, and an exacting and expensive one, and the conditions that have arisen will compel an editor to give his whole time to the making of a journal that shall be as complete as several that we have had for many years. The time has gone by when a man can practice his profession and conduct a journal in the manner in which journals are conducted at the present day.

If a higher tone can be given our literature by retaining its control, I shall welcome the change, but I have such admiration for what has been accomplished up to the present time that I have no fear for the future, whichever course is followed.

There is an interdependence between the interests of the supply houses and their journals and our profession that is the outcome of a natural development. In the great affairs of the world this union of commercial and professional interests is a unique development, but it is a perfectly natural one, because our profession has such a diversity and multiplicity of needs.

Nothing like this has ever existed in the world before. No other specialty in the healing art can for a moment compare with ours in the diversity of its necessities. And this condition must always remain, even though we are formally accepted as specialists in medicine.

THE RÔLE OF DENTAL SOCIETIES IN DENTISTRY'S ADVANCE.

I must also consider for a moment the part that has been played in our development by our society organizations. In the beginning of our independent career, the formation of societies was a logical necessity. It was a natural sequence following the establishment of the first dental college.

The first societies were made up of groups of men who were drawn together by friendship for each other, and because of mutual interest in a special work. Self-interest and the hope of self-advancement were also factors that led to action. The time had not yet come for the development of a deep sense of duty to our profession and our time. The vast importance of dentistry and its destined significance to the world was not yet realized.

Today the conditions are changed. Groups of men no longer control the destinies of our profession. Today dentistry is a vital force in the world, and from this time on, great societies like this, representative in character, will control its future. New conditions surround us, and we must adopt new methods of dealing with them. New obligations rest upon every member of our profession; it is no longer possible to live in one's shell and let the world wag as it will.

Our great societies have new functions that were not even dreamed of in the early days. The First District Dental Society of the State of New York for several years has given clinical instruction to classes in orthodontia, crown and bridge work, and in the treatment of pyorrhea, and it contemplates including clinical instruction in oral surgery proper. These clinics have been given for the benefit of those who have been long in practice and who have had no chance to keep up with the rapid strides of the times, and for those young men who were glad to have postgraduate instruction. They are in no sense antagonistic to the dental colleges, and are not intended in any way to take the place of college instruction.

Dr. W. W. Walker has devoted an enormous amount of time to their establishment as a permanent function of the society, and already there is a noticeable uplift of dentistry in our city. In this connection it is gratifying to note that the president of the American Medical Association, Dr. John B. Murphy of Chicago, said recently at its meeting at Los Angeles that—"When a license to practice has been granted a graduate of a medical school, it should be only for a period of say five or ten years, at the end of which time he should be required to pass an examination or take a prescribed course of study. This provision is necessary to keep the profession abreast of the times. A few enthusiastic men endeavor to accomplish this result now without the legal license requirements, by attending every year or two a course of postgraduate or clinical instruction in their own or foreign countries. This would greatly improve the efficiency of the medical profession, and the trusting public is entitled to it."

Words like these from such a source should give us courage, and should help us to realize that all along the line there is a general uplift in the healing art. I have so often spoken of the *healing art* because I think it the most comprehensive of any term yet in use. I like to think of medicine, surgery, and dentistry as specialties in that art. It makes all three of them subordinate, as they should be, to a higher conception.

Our new specialty of oral hygiene brings us nearer to medicine than we have ever been before, and our inspection of the teeth of children in our public schools and our interest in the condition of the teeth of the very poor will help to bring us recognition as a specialty of medicine from the world at large, as well as from medicine itself, whether we wish it or not.

THE MERITS OF DENTAL EDUCATORS.

In tracing the development of our profession to its present high estate I must not fail to give special recognition to that ever-increasing number of earnest men who have fitted themselves to become teachers in our educational institutions. As the twig is bent, so is the tree inclined. When a comprehensive history of dentistry during the last seventy-two years is written, these teachers must be given

first place. They have been builders in the truest sense, and they have builded better than they knew. They have labored for a profession that is now, and must ever be, unique in the subdivision of human effort, unique in having evolved independently of medicine, in containing elements that must ever keep it in practice somewhat separate from medicine, and yet, being so much a branch of the healing art that, contradictory as it may seem, it must inevitably be accepted as a specialty of medicine.

DENTISTRY'S EQUALITY TO MEDICINE.

This contradiction will be finally overcome by our colleges taking high ground, and insisting upon as complete a preliminary education, as long a term, and as rigid an examination as are demanded of any student in medicine.

Dentists and physicians will then stand upon an equal footing, the general education of one being equal to that of the other. The dentist may not be trained in obstetrics nor the physician in the art of filling teeth, but they will be equally trained in the fundamentals of the art of healing, and they will possess degrees of equal value.

If the degree of M.D., which represents a knowledge of the diseases of the human body, seems to outweigh in importance the degree of D.D.S., which represents a knowledge only of the oral cavity, it must be remembered that the teeth are unique and call upon almost every branch of knowledge for their care and treatment, so that one degree represents as much knowledge as the other.

I am bold to say that I do not believe it necessary for a dental student to take the degree of M.D. in order to be entitled to recognition as a specialist in medicine. Such a course means a tremendous loss of time in the study of subjects that have no relation to the oral cavity. But I do believe it is necessary for the degree of D.D.S. to stand for as much knowledge, though of a different kind, as the degree of M.D.

They do stand upon an equal footing today. At a late banquet given by the provost of the University of Pennsylvania to the teachers of the different departments, our beloved Dr. Darby was taken in on the arm of the provost and assigned to the seat of honor on his right. He was placed in this position, not alone because of respect for him as a man and a teacher, but because he represents the dental department, which is the most important one in the university, not even excepting the department of medicine and surgery.

The question of dental education will be simplified when this is understood and acted upon by our dental colleges. The degree of D.D.S. was essential at the time of the founding of the first dental college. It is equally essential now, as it stands for the education necessary to obtain the license to practice. It has been conferred upon so many thousands that it will never be supplanted by the degree of M.D., no matter what effort may be made to compel the adoption of that degree.

THE SURVIVAL OF THE FITTEST DENTAL COLLEGES ONLY.

Another reason for the permanence of the D.D.S. degree in the future is that it is an honest degree. It stands for the knowledge necessary to make an accomplished dentist without regard to the requirements of the law. The only danger to it will lie in the character of the

college that grants it. There can be no doubt that many dental colleges in the past, particularly those known as proprietary, have not been what they should have been. It is true that many such exist today, but they will not exist in the future. They will be excluded by the operation of the inexorable law of evolution, which in time excludes that which should not survive.

Large numbers of men are graduated every year, but not too many, if they are well equipped to do the important work on human teeth that needs to be done.

Selfishness is so much a part of human nature that colleges from which it is easy to be graduated are the ones one would expect to be crowded. And yet there is a growing feeling that it is not profitable to be graduated from them, and so the schools that have a high standard and have the facilities and the right men as teachers are the ones that are uniformly successful.

THE FUTURE OF DENTISTRY.

There is an uplift in our profession that will be its salvation. Its record of seventy-two years shows this. This study of the past and present of dentistry entitles us to prophesy as to its future. Remembering that it is really not long since there was no dentistry in the world, and realizing its completeness today, what have we a right to hope will be its future?

I think it safe to say that, on its mechanical or operative side, there will not be any very great advance. Such perfection of technique has already been attained that it seems impossible to go much farther. But this perfection of technique will be retained, for on it rests the main usefulness of dentistry to the world.

On its pathological side, and in its capacity as a broad and liberal specialty of medicine, capable of dealing with all oral conditions, it is only on the threshold of its career. It has been concerned in the past with repairing the ravages of disease. It will be concerned in the future more with the prevention of disease. Prophylaxis will be its great watchword. In the future, cleansing of the oral cavity will be as important as the cleansing of the teeth. Sprays for the mucous surfaces and the fauces, and tongue-scrapers, will be as necessary as tooth-brushes and tooth-pastes and powders.

The dental nurse. It will not be long before every important dental office will be equipped with its dental nurse, who will be specially educated, as must be every trained nurse employed in illness. She will wear the cap and gown indicative of her calling. It will be her duty to cleanse and examine the teeth, and chart the cavities of decay. Her bright eyes and delicate fingers will fit her for this work, and her ministrations in this special field must ever be agreeable to the majority of female patients. She will become a dental detective, with time to cleanse and polish vulnerable surfaces and find and chart obscure cavities of decay, and her good housekeeping instincts will enable her to guard with perfect cleanliness against the insidious approach of pyorrhea. She will be well fitted to do the dental chores, which a busy man should be saved from doing. Her maternal instincts will fit her for the sympathetic care of children, and particularly for the delicate technique of orthodontia.

Nature has not fitted her for the strenuous work of dentistry—that will always be better done by men—but she will be well equipped for the lighter work,

and eventually no important office will be complete without her. How she will be educated may not yet be clear.

A single term at a dental college would fit her for the work I have indicated, but a training school for dental nurses would be better suited to her needs, and to the needs of our profession. It is not too much to believe that such schools will yet be established. Dr. Rhein has long had this idea. This will be another important avenue open to women who have to support themselves.

Guided by the good judgment and strong will of a mature masculine mind, her place in dentistry will be secure. There will also always be a place for those women who fit themselves for full practice.

Prophylaxis. In China it is said the physician's fee continues while the patient is well, and ceases when he is ill. Eventually the public will discover that the dentist who practices prophylaxis will be the cheapest one to employ.

It is not the baseless fabric of a dream to believe that the time will come when large cavities will not occur. In many discerning patients they do not occur now; visits, with them, are made so frequently and examinations are so searching that small cavities are the rule, and large ones, requiring Taggart inlays, the exception. Sending for patients at stated intervals is a prophylactic measure of the first importance, and will be adopted in the future as a matter of daily practice.

Pulps will be seldom exposed, and there will be fewer dead teeth, and consequently fewer abscesses and fewer cases of caries and necrosis of the jaws. The specialist who administers nitrous oxid gas for the extraction of teeth will have less to do than he has at present. The surgery of the oral cavity will be done by specialists recruited from the ranks of dentistry, their digital dexterity giving them the lead in this important work.

Jaws will always be broken, third molars will always be impacted, and cleft palates will always need to be treated, so that a limited number of oral surgeons will always have their skilful hands full of important work. The ravages of pyorrhea will be greatly lessened, but since old age cannot be stayed, it will never be entirely overcome, so that dental prosthesis will remain as a last resort.

Professional and social standing. Dentistry will more and more become recognized as a specialty of medicine, both by the public and by physicians and surgeons, and dentists will be expected to take responsible positions in hospitals, on boards of health, in charitable institutions, and on committees devoted to the public welfare.

The social standing of the future dentist will rest mainly in his own hands. The dazzle of wealth will be forgotten beside the power of knowledge, and a degree in medicine or dentistry will carry the evidence of a liberal education, and if, added to this, there are high moral qualities and the charm of the refining graces of life, the dentist may share the society of the elect.

It behooves us, then, to arouse ourselves to a realization of this greater responsibility that will be placed upon us.

THE INSPIRING OUTLOOK.

It will be becoming in us to cultivate the self-respect that should go with our exalted calling, and to assume the dignity that should adorn any specialty of the healing art. Any serious review of the past in any department of human activity

must result in exalting the present. To remember what we have been and to realize what we are now, gives us a vital hope of the future. It gives more than a vital hope, it gives a positive assurance. Not a sentence I have written is so optimistic that it may not be realized yet.

We cannot help the swelling of the heart and the uplift of the spirit when we contemplate what we have accomplished in the last seventy-two years.

And how can we help feeling that God is with us in this work, which is making for the betterment of humanity!

And the joy of it all! To dry the tears from the sweet eyes of childhood by gentle treatment, to comfort old age by tender ministrations, and to assuage pain for all who suffer—to say nothing of saving from it—is it not worth while? What other work in all the world is more like that of the Good Samaritan?

Dental Ethics and Dental Patents.

By RODRIGUES OTTOLENGUI, M.D.S., D.D.S., LL.D., New York, N. Y.

WE are here assembled in national convention—and for what purpose? Primarily, for fraternal communion and exchange of ideas, to the end that we may return to our homes better prepared to serve our patients. Essays will be read to us by investigators, students, and practitioners, which will bring enlightenment upon many problems of our daily work. Clinicians will demonstrate to us better methods of accomplishing practical application of theoretical and technical teaching.

But of what profit to us may all this be, unless we keep the escutcheon of our honor unsullied? Therefore, with full appreciation of the many valuable scientific treatises listed upon our program, I venture to declare that I bring to you for discussion a subject of such vast importance that we might well consume every hour of every session in its consideration, if thereby we might forever remove that incubus which has proved such a burden upon the soul of our profession.

American dentists, believing themselves safe in a position of pre-eminence over all the dental world, have long been asleep, but with a slumber that has been fitful and restless, for they have been hag-ridden. Instead of the fabled broomstick, this witch has been hurtling through the darkest parts of our history, astride of a golden eagle; the screaming black cat sitting upon her shoulder answers to the name of Cupid, the god of love; but his full cognomen is Cupidity; whilst the brazen witch herself is decked out in silks and satins that she may masquerade under the holy name of Ethics. If we would unseat this hag, if we would unmask this witch, if we would exorcise this she-devil, who with her blatant blandishments, her tempting tongue, and her sordid selfishness has almost persuaded many of us that right is wrong and wrong is right, we must rend the veil—we must strip this strumpet of her silken rags and gaze with unflinching eyes upon the naked falsity which so long has deluded us.

DEFINITION OF ETHICS.

What, then, is Ethics?

I will not quote from the lexicons any academic definition of the term, for a decorative embellishment of words but helps to hide the fundamental truth, which, thus gayly gowned, only too closely resembles the masquerading hag from whose influence we would be freed. In brief, then, ethics is the science of right living.

By right living is meant that a man shall so conduct himself as to render full justice to the community at large, to each man with whom he comes into contact, and to himself. The most ethical man renders justice in the order named, to the community first, to his neighbor next, and to himself last. That man, therefore, is least ethical who considers his own interests as paramount to those of the world in which he lives.

This is the brief, but comprehensive exposition of ethics; yet there is a briefer one, for which we are indebted to our recent President, Theodore Roosevelt. Thus, epigrammatically we may declare that ethics means to render unto every man a "square deal."

DENTAL ETHICS TO BE MEASURED BY STANDARDS OF GENERAL ETHICS.

What of Dental Ethics?

Can dental ethics in any sense be ethics at all, if in practical application it transcend the rules of general ethics, the rules of right living, the rule of giving unto every man a square deal? The proposition answers itself. Dental ethics can no more antagonize general ethics than may an aldermanic ordinance have force if contrary to the statutes of the state, or legislative enactment endure if found to be opposed to the law of the land.

Thus dental ethics may be measured by the standards of general ethics, and any inequity thus found must invalidate the rule; indeed, the sooner such rule be abolished the better, else the inequity may prove a cloak for iniquity, as indeed has occurred with the unwritten rules of dental ethics in relation to dental patents.

THE UNWRITTEN ETHICAL RULE IN REGARD TO DENTAL PATENTS.

This leads us logically to the main issue—to that issue in regard to which the National Dental Association of America should, nay *must,* give serious attention, lest the good name and honor of American dentistry be further besmirched.

Almost the chief difficulty is that the ethical rule in regard to dental patents remains unwritten. The great wrong arising out of unwritten rules of ethics is that each self-styled ethical gentleman may write or read the rule to suit his own purpose, such purpose being largely dependent upon how deeply asleep his sense of honor may be, and to how much of the song of the broomstick siren he has harkened.

It is almost with a sense of deep shame that I declare that the time has arrived when the Code of Ethics of this association must be made to include a rule outlining distinctly just what the status of our dental inventors will be, if they dare protect themselves, their heirs and assigns, as do all other inventors. For surely, as a profession, we offer little inducement to men of genius to work out problems for us, if in return they are to expect professional ostracism.

I say this with shame, because it should not be true that dentists alone of all the world should require a written rule in regard to patents, lest they pervert justice by the misreading of an unwritten law. Yet such appears to be the present condition, and this association must disgrace our code with a definite rule in relation to patents, in order that the selfish members of our craft may no longer disgrace our calling by counseling the stealing of

the inventions of our investigators and discoverers.

THE ATTITUDE OF THE MEDICAL PROFESSION TOWARD PATENTS.

Since there is no written rule in our dental code which prohibits the taking or holding of patents, let us ask, Whence arises the notion that it is unethical so to do? There has been much dispute as to whether or not dentistry be a specialty of medicine, but, however that may be, we have many who have been graduated both in medicine and in dentistry. These naturally feel that they owe obedience to the medical code, even though they practice dentistry. Also, some of these doubly educated gentlemen think themselves doubly competent to determine for us what is right and what is wrong, what is ethical and what is not. Hence, since there can be found no mention of patents in our dental code, the pronouncement against patents evidently has arisen from the medical members of our profession, these in turn imbibing their ideas from the codes or traditions of the medical world.

The medical man was primarily interested in the cure of disease by the administration of drugs, and there was little if any opportunity for the taking of patents. It was only with the advent of the surgeon, who effected cures by the skilled use of his hands and the wielding of instruments, that any real occasion for patents came into existence.

The older medical man, therefore—the general practitioner, let us call him—easily adhered to the traditions of his profession and readily subscribed to all rules which separated him, a professional man, from the tradesman and the stigma of engaging in trade. For in the final analysis, as we shall presently make clear, there can be no valid argument against the taking and holding of patents, except this purely sentimental one, that the professional man should devote all his time, energies, and thought to the cure of suffering human beings, rather than to the more sordid work of amassing money.

Let us not forget, while considering this period of medical evolution, that this highly ethical professional gentleman, who could not tolerate the thought of being classed with tradesmen, was quite consistent, since he placed no price upon his service of alleviating pain, but trusted to the appreciation of his cured and grateful patient to properly compensate him with an "honorarium"!

Among those dentists of today who loudly cry, "It is unethical to take a patent," is there one sufficiently consistent to send bills in blank, permitting grateful patients themselves to decide upon the numerals that should decorate their checks? If such a man be present in this gathering, let him rise, and I will doff my bonnet to him in deference to his superior quality of ethics, however ancient I may deem the brand.

PATENTS AS A PROTECTION TO THE QUALITY OF AN APPLIANCE.

With the dawn of anesthesia, given to the world of sufferers by our own profession, successful surgery became an increasing possibility, and with it came an ever-growing demand for surgical instruments. Thus mechanics crept into medicine, and those medical men who essayed to restrict their practice to the new specialty soon found the need of perfection in the manufacture of their instruments. The bistoury must be of

finest steel and of temper to hold the keenest edge, else the patient must endure the trials of a jagged wound. The obstetrical forceps must be of accurate curve and of proper strength, or many a babe would "die a-borning." And so it is with every appliance, implement, or instrument in the entire armamentarium; yet how might perfection of manufacture be attained? In one way only: Through patents.

The manufacturer, owing allegiance to no medical sentimental rule of conduct, brazenly admitting himself to be a tradesman, and his aim to be the aggregation of filthy lucre, coolly demands protection before he will instal costly machinery in order to produce complicated pain-saving devices.

Let me forestall the eager cry of some critics: It is true that many—yea, very many—surgeons have invented life- and pain-saving appliances, and have refused to receive emolument therefor. Some of these may have acted wisely, but the majority "otherwisely." Some have published their inventions to the world, free for all men to make and use, with the result that few indeed have either made or used them. One great surgeon, of the old school, bitterly complained to me of his folly in thus giving a pediatric appliance to the world gratis. Specialists throughout the country engaged indifferent or unskilful mechanics to make this appliance for them; failures resulted, and failures were reported in the literature. Thus the appliance was lost to suffering humanity, except to that small part which was treated by the inventor himself, who personally supervised the work of a skilled artisan in making the apparatus.

Other surgeons have given their inventions exclusively to manufacturers, who in turn have taken patents, while the inventors, because of a sentiment against engaging in trade, accepted no share. In some instances this has served, but in the majority it has failed. The inventor, no longer owning a pecuniary interest in his device, has had no control over the finished product, which often has been made so as to yield the greatest profit rather than in such form as to render the greatest service.

DENTAL PATENTS AND HOLDERS OF PATENTS.

What has been true of surgeons and of surgical instruments has been true in a far greater degree of dentists and of dental appliances.

If, then, we are to imbibe our notions of ethics in relation to patents from the medical world, we should consider the present views of the surgeon rather than the ancient ideas of the general practitioner, and if we visit a surgical instrument shop we shall find the word "patented" imprinted as frequently on their goods as on those found in a dental depot.

Yet undoubtedly there be some who conscientiously think it unethical to take out a patent; some such men may be present. To them, with all becoming respect for their views, let me say: Gentlemen, have you paused to consider what the present status of the dental profession would be, if no dental inventor had ever taken out patents? Do you believe that our art could have reached the present stage of perfection without the earnest co-operation of our dental goods manufacturers? and do you believe that these manufacturers could ever have been induced to invest their capital without the protection afforded by patents?

If it really is, or ever has been, unethical to take and hold dental patents, permit me to read to you just a very partial list of men who are, or have been, open to censure. The following dentists have invented and patented appliances which, you must admit, have contributed largely toward dental progress: Frank Abbott, automatic plugger; Chas. L. Alexander, disk mandrel, plastic inlay gold, etc.; Edward H. Angle, tooth regulating appliances; G. V. Black, dental engine; Wm. G. A. Bonwill, dental engine, electric mallet, engine mallet, etc.; Truman W. Brophy, dental matrices; J. P. Carmichael, rubber dam holder, tooth crown, etc.; Wm. Crenshaw, dental matrix; J. N. Crouse, process of manufacturing fusible dental fillings, inlays, and crowns (this patent was granted June 4, 1907, but just what sort of process patent this is, the writer has not had time to investigate; it is interesting, however, since it is taken out by the head of the Dental Protective Association); R. B. Donaldson, nerve-canal cleansers; George Evans, seamless gold crown, root-drier, etc.; Wm. H. Gates, root-canal drill; A. DeWitt Gritman, jointly with Snow, dental articulator; Wm. E. Harper, contra-angle handpiece; J. G. Hollingsworth, method for forming dental crowns, die-plates, etc.; Miland A. Knapp, tooth regulating appliances; Marshall L. Logan, tooth crown; Wm. B. Mann, vulcanizer, chairs, etc.; S. G. Perry, dental engine, separator, etc.; Wm. H. Taggart, cast inlay; B. M. Wilkerson, chairs, etc.; J. Leon Williams, crowns, facings, etc.

A complete list of the dentists who have invented and patented useful appliances would fill many pages of print. I here enumerate just a few of the men who must be condemned, if the taking and holding of dental patents be declared unethical, in the revised Code of Ethics which this association sooner or later must formulate.

THE REASONS FOR PATENT GRANTS.

But why should our inventors be placed under a ban? Why should we set ourselves above and look askance upon those whose inventive genius has made our work easier—yea, and better? Why should it be counted wrong for any man, even a dentist, to take and hold a patent? I believe I have heard every argument ever set up against the taking of patents, but I deem it time wasted to enumerate and reply to them here. I shall simply elucidate the broad principles of patent rights, and leave it to those who will discuss this paper to show some valid reason why dentists should count themselves a class apart—a class which should neither profit by the law, nor obey the law.

Why then are patents granted at all?

Protection of the community and the individual. It is a common comment of common, and I may say of very common people, that "Laws are made for the benefit of the rich." Yet nothing is more repulsive to the essential principles of law than the favoring of one portion of the community more than another. Nothing more quickly annihilates a statute than proof that it is class legislation. It would be obnoxious to a fundamental rule of law, therefore, if it could be shown that patents are granted solely for the advantage of inventors.

Merwin expresses it as follows ("Patentability of Inventions"):

> The common law does not provide a patent system. It is created by statute only, and in the United States by virtue of that clause in the Constitution which confers upon Con-

gress the power "to promote the progress of science and the useful arts by securing, for limited times, to authors and inventors the exclusive right to their respective writings and discoveries."

The motive thus indicated for the establishment of a patent system is of practical importance. It shows that by the intendment of the Constitution a patent is not a free grant from the government to an individual, but a contract between them for the protection of the individual's discovery, in consideration of a benefit which he has conferred upon the public through the advancement of science or the arts.

This is the view of a legal mind expressed in legal phrases. Let me amplify this, in order to point a moral to the dental mind. All criticism to the contrary, the essential aim of all law is equity. In regard to inventions, and their protection by patent, Merwin clearly points out that the patent is but a contract; a contract between all the people and an individual. As this contract is formulated and granted by the people, it is reasonable that the people should be protected quite as amply as the individual. To this end the patentee is granted certain exclusive rights for a limited term, in this country seventeen years, after which his invention becomes the free property of the party of the first part—namely, the people.

Encouragement of invention. Abler minds than any in the dental profession long ago decided that the interests of the people, otherwise the community, would best be served by granting inventors a limited period of exclusive rights in the use or sale of their invention. Why? Because, without hope of reward no man will work—save only perhaps a very few highly ethical dentists. In order, therefore, to encourage invention, the state has but two alternatives; either it must purchase the invention outright from the common treasury of all the people, or else it must grant the inventor a limited period in which he might perfect and exploit his own invention, taking therefrom such profits as he might be able to procure, supplying himself thus with the means of livelihood for himself and his family. The state has elected the wiser and the cheaper course. For it is wiser and far less expensive for the people to wait seventeen years to become possessed of an invention, than to purchase all inventions worthy of a patent, utilizing the public treasury therefor. By allowing the inventor himself to exploit his invention, the people finally become possessed of all inventions and may utilize the most useful without drain upon the public purse; while during the seventeen years of waiting time the inventor receives his pay directly from those who have most need of and use for his invention. Thus the patent is seen to be a just and a self-adjusting contract.

INJUSTICE TO HOLDERS OF DENTAL PATENTS.

Yet there be some in dentistry who desire us to spurn such an agreement. Dentistry alone (unless we include medicine) of all the arts and sciences must be deprived of the advantages of the patent system, a system adopted by all countries and for all peoples.

Very well; let us consider that proposition for a moment—a very brief moment. If dentistry must spurn the taking and holding of patents, as being beneath its dignity, then our profession, with altruistic consistency, must adopt that alternative which the state has refused. If ethical dentists may not take out patents, then it behooves us as an ethical body of professional practitioners to set aside a sum out of our yearly earnings, with

which to pay inventors for those inventions which we find useful, yea, needful.

Yet, stay! There is another alternative that has been overlooked by the state. We need not permit our members to take patents; we need not purchase the product of their brains; we can simply steal their inventions. Harsh words these are, but that is exactly what we are even now advised to do! Of course we are not counseled to don the cloak and mask of the housebreaker, and to feloniously enter the offices and homes of inventors with jimmy, dynamite, and dark lantern. We could not be expected to do that; we are too ethical. Besides, there are politer ways of robbing men in these days of higher civilization. So careful is the law of all men's rights, that the unrighteous often may actually appeal to legal methods to accomplish illegal ends. If we resist a patent in the courts of law, it is not difficult to so prolong the argument that several of the inventor's seventeen years of patent rights may be wasted for him. And during these years of contention may we not freely use the poor patentee's inventions? Assuredly! Why not?—who is there to stop us? The inventor is kept too busy in the courts to have time for prying into our laboratories.

PROCESS PATENTS.

Telepathically I hear many of you thinking to yourselves, "What is he talking about? Who objects to patents in general? It is only the process patent to which we object."

Ah! Indeed! Is it so? Then, my friends, have you studied out this question? Do you know what process patents are? Can you or do you discriminate between the process patent which is righteous and the one which is not?

To those who think that all the argument already presented is beside the question, I have two things to say:

First: That so far as the principles involved are concerned, principles which I have endeavored to expound, there is no difference between a patent on a process and a patent of any other sort. The law of the land sanctions one quite as fully as the other, and it is as great a breach of law to infringe one as to infringe the other.

Second: I will now mention by name what you all know that I have in mind, that is the Taggart patents, and I shall endeavor to show that his so-called process patent is not a true process patent in law, nor yet a process patent within the limits that have been set up by the dental profession.

Definitions.—Let me quote to you from "Curtis on Patents":

> An art is a process, a method of doing something, distinct from the mechanical, chemical, or other tangible means whereby it is done.

Let me pause here to point out that the Vulcanite Rubber Company patents and the Tooth Crown Company patents were process patents of this character. They were patents on methods of doing something, distinct from the mechanical, chemical, or other tangible means whereby it was done. Continuing the quotation from Curtis—

> "A machine," said Mr. Justice Bradley, "is a thing. A process is an act, or a mode of acting. The one is visible to the eye—an object of perpetual observation: the other a conception of the mind, seen only by its effects when being executed and performed."
>
> A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing. If new

and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art.

We have already seen that Congress has been empowered to grant patents in order to advance the progress of science and the useful arts, and now we see that, in the language of patent law, process patents advance the arts. What wonder, then, that process patents should be the equal of any other kind. *Why* dentists should resist process patents has been fully discussed by the writer in the past. *How* they should resist them is another matter; there is but one honorable way —by legislation. That was tried, and failed largely because of the indifference of the profession, who rendered little assistance.

Next let us consider another, and to us the most important, definition given by Curtis:

A machine. When the supposed invention is not a mere function or abstract mode of operation, separate from any particular mechanism, but is a function or mode of operation embodied in mechanism designed to accomplish a particular effect, it will be a machine in the sense of the patent law.

At a dental society meeting recently held in Missouri, that state whose citizens are always asking "Why?" Dr. Dameron is reported to have used the following language:

In 1901–02–03 Dr. Ottolengui wrote some excellent editorials against the granting of process patents. He even went so far as to introduce into the United States Congress a bill prohibiting the granting of process patents (in dentistry). Why he changed his opinion is an enigma.

To Dr. Dameron *et al.* the writer begs to state that there is no enigma, since he has not changed and does not expect to change his mind. If men have read my editorials without comprehending them, and if they choose to quote them in efforts to prove that I said what I never have said, the fault is theirs, not mine.

DIFFERENCE BETWEEN TAGGART'S PROCESS PATENTS AND OTHERS.

Let me now endeavor to show you just wherein lies the difference between Taggart's so-called process patents and those of the Rubber and Crown Companies.

According to the Taggart patents, all of which are before me, the original application was filed January 7, 1907. At the Missouri meeting, replying to Dr. Dameron, Dr. Taggart declared that his original application was a request for a single patent covering his invention, but that the Patent Office returned his application directing that his claims be divided. Thus it was by government dictation, and not at Dr. Taggart's desire that this so-called process patent was granted. This statement by Taggart is borne out by the fact that on the patents appears the statement that the original application was divided.

It would take up too much time, and would occasion too much technical discussion to here describe in detail the claims of the Taggart patents. I can, however, give a *résumé* in brief.

The first patent granted to Dr. Taggart is entitled "Apparatus for making molds for the casting of dental fillings and the like." This patent protects the flask, the cover of which contains a projection known as the crucible-former, the same having an aperture for the reception of a sprue wire. This patented apparatus appears to be so essential to the art of casting fillings that, so far as I have been able to discover, no one has yet devised a casting machine which can be utilized without infringement of this patent.

The second patent granted was the so-called process patent. This is entitled: "Method for making molds for dental inlays and the like."

Referring back to Curtis' definition, we read that when the supposed invention is not a mere function or abstract mode of operation, separate from any particular mechanism, but is a function or mode of operation embodied in mechanism designed to accomplish a particular effect, it will be a machine in the sense of the patent law.

Now, an analysis of Taggart's so-called process patent discloses that this method is not a mere function or abstract mode of operation, separate from any particular mechanism, but, on the contrary, that it is a function or mode of operation embodied in mechanism designed to accomplish a particular effect, said mechanism being, first, the flask having the crucible-former and an aperture for the reception of the sprue wire, protected by Taggart's first patent; and secondly, his casting machine, protected by a third patent. Consequently, according to patent law, this so-called process patent is not a process patent, in the sense that the Rubber and Crown Companies' patents were, but on the contrary is essentially a machine patent, granted in conjunction with two other apparatus patents to protect the inventor in his rights in his invention.

TAGGART'S PATENTS NOT PROCESS PATENTS.

And now let me show that the Taggart patents are not process patents within those limitations which have been set up in the past by the dental profession.

There have been two epochs of strenuous fighting against so-called process patents—one against the Rubber Company and one against the International Tooth Crown Company. How did these companies seek to obtain revenue? By collecting royalties or by the sale of licenses. They had no other means of realizing financially upon their patents. They had absolutely nothing tangible for sale. Their patented processes were purely "abstract modes of operation, separate from any particular mechanism."

Quite the reverse is true of the Taggart patents. In the first place, Taggart offered for sale a machine with which his process may be practiced—a machine, indeed, essential to the proper practice of the process; and the purchaser of the machine acquired full right to practice the process without further license, and without payment of royalty. Secondly, this process cannot be practiced without mechanism designed by Taggart especially to be used in the process, unless the practitioner use similar devices made by others than Taggart, which devices are infringements of Taggart's apparatus patents.

Dr. Dameron has said, and others have industriously spread the report, that I once preached against process patents, and that since then I have changed my mind. Bear with me just a moment that I may disprove this.

I have never declared that dentists have a right to infringe upon a process patent, because I have never deemed it ethical for a dentist to break a law, however obnoxious the law might be to him.

THE DENTAL PROTECTIVE ASSOCIATION.

When the Dental Protective Association was first formed, I did my share—indeed, more than one man's share—in obtaining members for that organization.

But some years later, when I learned more of its workings, I openly opposed its methods of fighting existing patents, endeavoring to invalidate them by proving prior invention, or breaking them down by legal technicalities. I declared that an organization engaged in such work was merely a trades union, and this I still believe. I advocated an appeal to Congress for an amendment to the patent laws prohibiting the granting of process patents of the kind objectionable to dentists.

PROPOSED AMENDMENT TO PATENT LAWS.

In January 1898 I published an editorial in which I expressed my views as to the amendment which should be made to our patent laws. This can be found in *Items of Interest,* January 1898, page 62, and reads as follows:

> But no patent shall be granted upon any process or method of treating human disease, nor upon any process or method of restoring or replacing any lost part of the human body, except upon artificial substitutes, whole or in sections, which may be manufactured, sold, and delivered without exaction of any fee, license, or royalty, beyond the common selling price of the manufactured articles.

In the same editorial (pages 61, 62) I used the following language:

> There must be no confusion in the mind relative to the class of patents which we wish to see abolished. Whatever may be honestly invented, and subsequently manufactured and sold, is a legitimate subject of patent. Even a process may be properly patentable, where it is a process of manufacture, the product being placed on sale at a common price to all.

With these two paragraphs before us, expressing as they do my views as published more than a dozen years ago, let us once more discuss the Taggart patents, and thus discover to what extent I have changed my mind.

I have already described three of Taggart's patents which jointly protect his machine and the use thereof. But he holds a fourth patent, which, as far as I can understand it, seems to be a combination of a process patent and an apparatus patent. This is a patent upon a tooth filling made by casting, and it also protects the method of making this cast filling. Thus we find that Taggart not only owns a patent upon his machine and the process of using it, but he also has a patent upon the product of his machine, and the method of producing that product. In plainer language, he has a patent upon the cast inlay itself, and anyone who makes a cast inlay, without Taggart's consent, infringes that patent regardless of what machine may be used.

If you will study well the amendment to the patent laws suggested by myself in 1898, as well as the other paragraph quoted, you will observe that this style of process patent is especially excluded from the restriction of the law recommended. For the amendment makes exception of artificial substitutes for lost parts of the body, whole or in section, which may be made and delivered to all at a common price. And the other paragraph declares that even a process patent may be proper where it is a process of manufacture and the product is placed on sale at a common price to all.

POSSIBLE CONSEQUENCES OF TAGGART'S PATENTS.

What, then, is Taggart's position? With his four patents, he may say to us, "Gentlemen, you may make your own choice; if you prefer to make your own

inlays, you may purchase my machine, and thus have full right to operate under all my patents. If you do not care to buy the machine, you may send me impressions of cavities, or wax inlay patterns, and I will make the cast inlays for you."

Taggart has not yet said this, but I merely point out to you what he has the right to do. This second proposition is no chimera. It is being done today all over this country, by men conducting laboratories. These men charge a definite fee for casting inlays, to which is added the cost of the gold. Thus Taggart, if he chose, could set up laboratories throughout the country, and furnish his patented cast inlay, as a product of manufacture, and at a common price to all.

Thus, gentlemen, when you study the Taggart patents, as I imagine few of you have done, you will find that, in reality, Taggart has protected his invention with the kinds of patents which we have all been declaring are perfectly legitimate.

IS THE ATTITUDE OF THE DENTAL PROFESSION TOWARD TAGGART ETHICAL?

This brings us logically back to the subject of this paper—ethics in relation to patents. Has Taggart done anything unethical? I leave the answer to you. But whether Taggart has been ethical or unethical need concern us little; after all, he is but a unit in the professional body. But what of our conduct toward him? Have we treated him in an ethical manner? We know that it is an illegal act to infringe a man's patent rights, although for that he may seek redress through the courts. But is it ethical for a professional body to treat a prominent man as Taggart has been treated? Is it ethical to band together in an endeavor to break down Taggart's patents on some technicality, or through some doubtful claim of priority? It is said that certain heretofore unknown men have done these things before Taggart? Did these men perfect these ideas, and give them to us that we might all use them? On that memorable occasion when, in New York city, Taggart gave his first demonstration, and five hundred men vociferously cheered him, was there a man present who had ever heard of such a thing as a cast inlay? Is there a man present now who, within his own heart, doubts that, but for Taggart, we still would be filling teeth in the old way?

I have recently made an investigation of the amount of pure gold used by dentists within the past year for the making of inlays, and from this investigation, a report of which will appear in *Items of Interest* in August, I deduce that at the very lowest estimate the dentists of this country have made a profit of one million dollars, during the last twelve months, by using Taggart's invention. Does anyone know what Taggart's profit is, to date? Would we not all be ashamed to inquire?

Pending the Taggart-Boynton suit, thousands of men have been using Taggart's invention, under the specious and false argument that a patent is worthless until declared valid in a court of law. Suppose that the courts sustain the Taggart patents, as I have not the least doubt they will, then all those who have been making inlays, with other than Taggart machines, will be in his debt as infringers. Will all these men voluntarily offer some sort of financial settlement with Taggart?

Will it be ethical conduct to do otherwise?

Gentlemen of the National Dental Association, a serious duty lies before us. Either we must abandon our code of ethics, and leave every man to the dictates of his own conscience, or lack of conscience, or else we must maintain our boasted standards of professionalism and so conduct ourselves as to yield unto every man that which is justly his.

To accomplish this we must revise our codified rules of conduct, and so treat this question of ethics in relation to patents that it will never again be possible to pillory a great benefactor.

I gave one brief definition of ethics when I said that it means a "square deal," but I can give another definition in a single word: Ethics implies HONESTY.

Discussion.

Dr. JOSEPH HEAD, Philadelphia, Pa. It is a moral and legal law of the land that a patent is not conclusively a patent until it has been passed upon by the Supreme court, and anybody who considers himself unjustly hampered by a patent has a moral and legal right to contest it to the highest tribunal. In spite of this self-evident proposition, there seems to be a general opinion that we who contest the Taggart patent are doing it from dishonest motives and without any moral justification.

Many times men discover a new process simultaneously, and many times the one who discovers it second or third cuts off the original discoverer from using it by taking out a patent. One scientific discovery frequently makes the next discovery so obvious that the purely commercial man, under the patent laws, has a great advantage over the man who works and develops his ideas for the sake of scientific interest.

But when it comes to patenting processes intended to relieve the suffering of humanity at large, it is really a sin against the public good for a man with purely commercial instincts to take out a patent, thus barring his fellow workers in the just and sometimes obvious development of their efforts to relieve pain and suffering. Every earnest dentist should live, and live comfortably, but a too keen rivalry on the subject of human pain and unhappiness is disgusting and unprofessional. And it is for this reason that dental process patents are to be deplored; it is for this reason also that all dental process patents in all justice should be closely scrutinized, and where deemed advisable carried to the Supreme court, so that the profession may be assured that their professional liberty of action is not curtailed illegally.

We all admire Dr. Taggart for what he has done; we all feel under obligations to him, but while we would be glad to see him adequately recompensed for his efforts and time, we do not feel as a profession that we have the right to submit to the great evil which would come to us if we accepted the so-called process patent; for whether Dr. Ottolengui explains it in one way or another, the Taggart patent will always be called a process patent, and will be made a precedent in law, as have been other patents of a similar nature, such as the rubber patents and the Richmond crown patents. We all remember how the members of the profession were subjected to persecution in those days; how spies were put upon us, how finally one dentist shot a spy in California, an act which stopped the rubber persecution. But when rid of the Rubber Company, the Richmond Crown Company came for-

ward, and while they may have had some good patents, they had a great many iniquitous ones, and so many offenses and wrongs were perpetrated on us in the name of justice that the profession finally rose up and fought them to a finish.

I agree with Dr. Ottolengui that there is nothing wrong in patenting an instrument, and there is nothing wrong in a man being recompensed for his efforts, but it is a feature of our law that justice will not be allowed to the individual if it is to cause a widespread wrong to the community. As Dr. Ottolengui says, the community is greater than the individual, and the right of an individual which would create widespread wrong to the entire community is a great wrong, and no man has the right to exact his so-called right at the expense of wholesale wrong to everybody.

This is a broad subject, and Dr. Ottolengui has befogged the issue. Nobody desires that Taggart shall not be given compensation for what he has done, and there are many in the community of whom Dr. Ottolengui speaks who are willing to give this compensation without it being exacted. All dentists are not working merely to get something for themselves; some actually care primarily for the welfare of their patients, and when a man comes forward and says that he has done so-and-so for the profession, and then turns around and tries to grab money for it, he largely forfeits our first enthusiasm. If any dentist here legitimately succeeds in making money, he is to be applauded, for the success of every single individual is a part of the success of the whole profession. I bless the time whenever I see a dentist retire with sufficient money to live happily in his old age. The point we should all remember is that the process patent prevents the use of a method by men generally, although this process may have been discovered independently before or after the patentee has discovered it. This restriction should not be possible in the alleviation of human suffering. Dentistry and medicine should come under a different ruling from ordinary commercialism, which is merely a question of dollars and cents.

In concluding, I would impress on you that if Dr. Ottolengui's fallacious argument concerning process patents is given countenance at this meeting, the dentists of the future will find that we have tied our own hands, and riveted on our posterity the collar of commercialism.

Dr. J. N. Crouse, Chicago, Ill. I think I know a little of this subject. The dental profession is averse to nothing more than to a process patent, and why? The Goodyear Co., the first to obtain a patent which was sustained in court and the substance of whose patents was the process of hardening rubber by vulcanizing, after collecting a royalty for seventeen years said that the dental profession was educated up to paying royalties, and it would be a pity to waste the opportunity, and so they took out another patent known as the Cummings patent. The substance of this patent was the process of waxing the piece, setting it in the flask, melting the wax and taking it out, and then packing rubber in the mold cavity, vulcanizing and finishing the plate. This was all included in that patent, which was not worth the paper on which it was written. That is where the Protective Association began. If I could have induced the dental profession to stand with me, and give me five thousand dollars to work with, I could have saved them fourteen millions of dollars—that is what it cost the dental profession. I spent sixteen long months on this. I ran it

through the Supreme court on the charge of collusion, and proved that, and the case was remanded by the courts for a hearing, but I could not raise money enough to get a hearing. That was the condition of the profession at that time. Next came the Crown Company. What did they do? They bought up all the patents they could get hold of, and started out to make the profession pay a royalty or license; and that is where the Protective Association did its work and made good. We cleaned that up in great shape. And now comes Taggart. I looked into the different phases of this invention very carefully, and made up my mind that Taggart would want something, if his patents would stand in court, and it behooved me to get a cover on him so he could not do what the Rubber Company did. We have it fixed so that anybody who joins the Protective Association can get all of Taggart's inventions for twenty-five dollars.

Dr. Richard Summa, St. Louis, Mo. A process patent royalty is a tax upon the manipulative skill of the workman. This strikes at the base of human liberty; it seriously interferes with the development and progress of any vocation.

That "Money makes the mare go" is an old-established fact, therefore we must not blame anyone for resorting to any means sanctioned by law to obtain this money. On the other hand, there are the people from whom this money to make the mare go is taken, and we must not blame these people if they object for dollars' sake, or what is better, for principle's sake, to the payment of taxes which interfere with their development and progress.

In the case of process patents it is an individual, the patentee, or at most a company, exploiting a patent claim which imposes a tax upon the manipulative skill of the masses.

The validity of all patents, whether upon a device or material or a process for accomplishing certain results, is decided by a court of law, and the contestants must abide by the final decision.

The essayist has referred to his editorials of 1901, '02, and '03, and states that he is not to blame if his readers are too ignorant to understand them. I am free to confess that I have been too ignorant to understand many things he said in the light of his interpretation of today. They were good editorials if they conveyed the meaning I understood them to convey; if otherwise, they were bad.

None of his arguments today have convinced me that there has been any logical ground for his change of front. His attempt to explain away his change of coat reminds me of the arguments a lawyer would use in trying to persuade a jury that a case of premeditated murder was a case of justifiable homicide.

Process patents have been sufficiently objectionable to the dental profession to have caused the formation of a protective association, of which Dr. Crouse is the head. In those days we were presumably defended against patents, and therefore I could not understand Dr. Crouse's change of coat until I learned from Dr. Ottolengui's paper today that Dr. Crouse himself had secured a process patent not long ago, and this accounts for his change.

In the days of Dr. Ottolengui's editorials against process patents Dr. Crouse was not sufficiently aggressive to suit the editor, and now they have both had a change of heart simultaneously, and Dr. Crouse as the one-man Dental Protective Association has assumed the right to force the dental profession to the recognition of

a process patent, and has asked us for an additional fifteen dollars. This is cheap enough. Dr. Crouse told us in Des Moines that the dental profession is a very cheap profession, being made up of "small potatoes," and I presume that this is his reason for having set such a cheap trap to get us to join the file of weaklings.

It is up to the profession to say whether or not we shall recognize a process patent in this instance. But remember, if you do it, it will not be long before another clever fellow will hand you another one.

I could say more on this subject, but the time limit forbids.

Dr. M. L. Rhein, New York, N. Y. After the wonderful address to which we have listened was completed, it appeared to me as though there was nothing further to say on this subject. Although I am very intimate with the essayist, I did not have the faintest conception of what he intended to say, but it appeared to me as though he had said the final word on this question, when to my amazement two gentlemen occupied this platform and have done what they could to give an excuse for the dentist to be a common thief, nothing less. Do you intend to stand for honesty, or dishonesty? Are the products of a man's brain any less tangible than the contents of his pocketbook? What does it matter in this question what the attitude of the inventor is, whether he be a philanthropist or whether he wants recompense? That does not concern us. If the inventor wants pay for what he has given, and the law entitles him to it, and we endeavor to take that product illegally, then we stand on a par with the thief. It is not a question of what his position may be. The only reason I have in taking the platform for a moment is to make clear to you that this is the *only* issue. There can be no difference in ethics. Ethics for the dentist must always remain the same as ethics for everyone else in the world. Its true simplicity is explained in that old doctrine of treating your fellow man as you expect to be treated.

Dr. E. A. Bryant, Washington, D. C. I have listened with a great deal of pleasure to the position assumed by Dr. Ottolengui. He and I made a strenuous fight before Congress in 1889 and 1890 against the issuing of process patents, and we received but little aid from the profession while doing so.

I have had some experience with the dental profession as an inventor myself. There seems to be a tendency to pilfer inventions, methods, and processes, as well as credit for them. Perhaps many of you are familiar with the little set of instruments for repairing bridge work manufactured by the S. S. White Co., and sold throughout the world. That was a patented method of my own, which was published in the *Dental Cosmos* as soon as the patent was obtained. Notwithstanding this, two dentists wrote articles claiming to have invented the method, published their papers in the *Dental Cosmos,* and even went so far as to use the illustrations of the bridge repair set as part of their papers.

When I was before the committee of Congress urging an amendment to the patent law to stop the issuing of patents on processes of the description given by Dr. Ottolengui, we had at that time, as a member of the Patent Committee, the present speaker of the house, Mr. Clark, who favored our bill in the committee, and had it favorably reported to the House. Our bill also had the support in the Senate committee of Senator Platt of Connecticut, who at that period was considered the best authority on patent law

in the Senate. Opposition to our bill and lack of courtesy to myself was one of the causes that led to the resignation of the then commissioner of patents. Being refused a hearing before the commissioner as to the merits of the bill I was promoting caused me to lay the matter before the president, Mr. Roosevelt, who immediately gave me an order on the commissioner for a hearing, and requested the commissioner to report to him, with the indorsement "I hear well of this bill."

At this period there was uncertainty as to the right of the Patent Office to grant patents upon processes not involving chemical or other elemental action, owing to the decision of the Supreme court in what was known as the Risdon Ironworks case, followed ten years later as indicated in the Westinghouse case by the same court, "that it was still an open question if processes were patentable under the laws of the United States unless they contained chemical or other elemental action." With all these favorable conditions confronting Dr. Ottolengui and myself, we were compelled to drop the agitation owing to lack of support by the dental profession.

But now the situation is different so far as the court's decision is concerned, the Supreme court in its decision in the "expanded metal case," rendered about a year or so ago, having reversed its former position and decided that processes are as much subjects for patent as a machine. That is the situation today, and there is but one sensible way to overcome it, namely, by legislation in Congress.

That we still have friends on the Patent Committee is evidenced by the request made of me only a few days ago—"Doctor, we are going to try in the Patent Committee to reduce the period of patents and do away with some of them. Can't you come up and help us out?"—by one who was a member of the committee when we made the fight before, and was favorable to our contention at that time. That means that if the National Dental Association wants to do away with process patents legitimately, we shall have to go before Congress with a bill, and Congress stands ready to do something for us, but I can assure you that progress will not be made by overriding the laws of the land. Every man, under the present law, has a right to obtain a process patent. If we are not interested enough to have the laws changed, we should obey them, and if we are not honest enough to obey the laws, then to be consistent we should go into the stealing business out-and-out.

Dr. M. F. Finley, Washington, D. C. In the remarks I wish to make on this subject I shall confine myself simply to a statement concerning the suits, as I am more familiar with that. The District of Columbia, which is neither a state nor a territory, and some have said is not anything, was picked out as the scene of this battle because of the hope that it could be carried to the Supreme court of the United States for final decision. I must inform you, however, that that procedure is no longer available, as on January 1st of this year that opportunity ceased for any case that had not passed a decision in the first court. This suit was brought in July 1908, and I have had the temerity to undertake to defend the suit. The gentleman who was sued was not a member of the Dental Protective Association under Dr. Crouse's leadership, but Dr. Crouse had an opportunity to take over the proposition and refused, because, as he announced, he had neither the money nor the disposition to undertake to defend the suit. It has developed in the

last few months that he has several thousand dollars of our money contributed for this purpose of determining whether a patent is valid or invalid.

It has been said in this paper that the defense is killing time. The plaintiff occupied thirteen months in rebuttal, after which the defense had its last say in redirect and sur-rebuttal, taking evidence on July 22, 1911, and it is now up to the plaintiff to have the last say. We are not afraid of the final decision in spite of all that has been said. To support what we think is good testimony, we have had the opinion of an expert lawyer who has had seventeen years' experience as an examiner in the Patent Office, and has spent all of these years in the division of chemistry and metallurgy. This counsel has said that our testimony absolutely covers every claim in Taggart's patent as presented in the wording of that patent, the basis of the suit. Furthermore, the machine was withdrawn from the suit when the first witness was examined, and the suit is now based simply on the process of placing wax against a tooth surface, obtaining the occlusion and form, removing, investing, and burning out the wax, and that is all. The added patents mentioned in this paper were granted in February of this year, and play no part in the Taggart-Boynton suit. We have the statement of Taggart's attorney in the March *Items of Interest* that if this suit against Boynton is lost, he will sue every dentist who has not secured Taggart's consent to use his devices and claimed process. That, of course, is his privilege.

Dr. J. P. Buckley, Chicago, Ill. I rise because of insinuations that have been made with reference to "wholesale wrong" and to "cheap traps" supposed to have been laid by Dr. Crouse. Dr. Head made the statement that when the matter of justice involved one man, justice should be done to that man, but if justice to this man produced wholesale wrong to a large number of individuals, the interests of that man must not be considered, or justice must not be done to that individual. I have no doubt that the sentiment back of a statement of that kind is correct, but wherein lies the wholesale wrong done by acquiescing to the demands, if demands you call it, made by Dr. Taggart? I am a party to that agreement. I felt that I was doing my duty, and have never labored harder for anything relative to my own affairs than I did for bringing about that compromise between the Dental Protective Association and Dr. Taggart. Tell me wherein the demands made by Dr. Taggart, or wherein the terms of that agreement—with which, I take it, all those present are familiar—will do a wholesale wrong? Dr. Ottolengui said that by a conservative estimate one million dollars has been collected or made in one year by those who are profiting by the invention of Dr. Taggart.

I have traveled over this country in the last three or four years, meeting dentists here and there as much as any other one man in the dental profession, and wherever I went men have come to me knowing that I hailed from Chicago, and have asked me these questions: "What is your attitude toward Dr. Taggart? Are you using a Taggart machine?" "I do not want Taggart's machine, but I feel somehow or some way that we owe Dr. Taggart something—I wish, in other words, that something could be done wherein I could use the machine I have now, a machine I purchased before I could procure a Taggart machine, and still give Taggart $25, or something like that, but I cannot afford to pay $110 for a machine." I have heard such remarks all over the

country. I had enough to do, and yet when Dr. Crouse asked me to take a position on the directorate of the Dental Protective Association, knowing that already I had more than I could do, I accepted. I joined with Dr. Johnson and Dr. Crouse to bring about a compromise with Dr. Taggart. Some have called this compromise a cheap trap, but you cannot call it that when I am here, without insulting me. We proceeded as we did because we felt that this was the age of compromise; we knew that the things Dr. Bryant has told you of were going on in the Patent Office, and we realized that conditions were different from what they were when Dr. Crouse squelched those patents in the days gone by.

I am here because I believe that I am interested in something that is right. I am here because I believe that what the Dental Protective Association has done will reflect and redound to the good of the dental profession. We endeavored to bring about a compromise between these two men, whose dispositions were such that it was almost like bringing two bulls together. Dr. Johnson was seated on one side of the table and I on the other, trying to compromise between Dr. Crouse and Dr. Taggart, and these men were worked up to a considerable pitch at that time. If we could come to an agreement—and we felt that one hundred dollars would not be too much—we wanted an agreement by which there would not be any hardship imposed on any man. We felt that the profession owed something to Dr. Taggart, and every man who discussed the proposition with me has admitted that he owed Dr. Taggart something. The question, then, that confronted us was, how we could bring about an agreement whereby we could compromise the matter without imposing any hardship on anybody. And now we are told that the terms of that agreement—the payment of fifteen dollars to Dr. Taggart—are a cheap trap, which will wrong many to give that one man justice. I would like to know how justice can be brought about in any other way, and I am willing, if you can show me, to accept your opinion.

Dr. B. Holly Smith, Baltimore, Md. The professor of surgery in my medical alma mater lay on his dying bed, and with him was one of his brother professors, when the dean of his school called. As the servant was showing him upstairs, the dying surgeon said, "Oh, the dean is an awful nice fellow, but d—— his jokes!" I say that Dr. Taggart is one of the finest men I have ever known because of his charming personality, and because of his wonderful skill in the perfection of some instruments which have been of great value to the dental profession, but incidentally I say, D—— Taggart's patents!

I would not have this association enter for one moment upon any retrograde movement in professional standing or in appreciation of that goddess of Ethics, whom the essayist has pictured as degenerated into some bug or beetle, or some repulsive figure of wanton nakedness. I am not surprised at the essayist. He is one of the cleverest men I have ever known, but he has lived for years in an environment of commercialism. He has been the editor of a commercial journal, and I defy any man, however pure and sweet he may be, to live and walk in an atmosphere without breathing it. I protest that the highest ethical standard, the standard we have known of old, that which we have inherited from the men who have been life-savers, men who have sacrificed their time for the amelioration

of suffering and the benefit of humanity —I protest that that standard shall be maintained, and that no gold bugs or beetles or wanton nakedness shall take its place.

Dr. Goslee. Before the subject is closed, I would say that the gentleman who seems to be under discussion on this occasion is present, and I think we should hear from him.

Dr. W. H. Taggart, Chicago, Ill. I must confess that it is a rather embarrassing position to rise here on the platform, and try to establish the legitimacy of my own child. Statements of such a nature have been made here that it would seem almost unkind to have those who know less of the subject go away believing them.

Speaking of this process as being one which benefits the world, and for that reason should be given free to the world, draws me back to the time when I first went to New York, and at the First District meeting gave a description of my process. Some of my best friends there advised me not to take out a process patent. Patents, however, had been applied for at that time, and if they had not, I could never have applied for them afterward. I asked my advisers for their reasons. They said because it was such a humanitarian process, and humanity should be given its benefit, and no one man should reap the reward. With almost prophetic vision I answered in this way: "If this is a humanitarian process, and you dentists would band yourselves together to give it to humanity, I will give it to the world for nothing, but I do not propose that you forty thousand people should consider yourselves humanity as against the eighty-five millions in the United States." In other words, has there any man, since this process came out, given humanity, in the sense of these eighty-five million people, one iota of the profits of this beautiful scheme? No, he has put it in his own pocket, and considered himself humanity. For that reason I consider that every man who has charged his patient a fee, and at the same time objects to my charging him a fee, is robbing humanity of what he wants me to give to humanity.

Speaking of the patents, there has been no attempt made on my side to hang up the suit. We have done everything we could to hasten it. If you have ever had anything to do with a lawsuit, you know there are certain conditions that you cannot hasten. Within the last few months, when they knew their own side had reopened the case, Dr. Finley sent out a call for a new Protective Association to be formed, in which he states that the plaintiff has kept the case hung up beyond reason, when as a matter of fact they reopened the case, because they said they had special information that they wished to bring before the court. While Dr. Finley says now that it is our fault, the day when I left Chicago, two days in advance of the time set for the hearing, they had never given any information to my side that they were there. Dr. Finley also said in the call for the new association that Taggart, in order to boost his process patent, had recently taken out three other patents. These three patents are all the stronger because they were issued only last February. These were the original patents as first applied for, the last four years having been spent in investigation of the subject, and I was granted these patents only in February. Does that show that they were recently taken out to boost the original game?

I have nothing more to say. I thank you for the privilege of the floor.

Dr. Ottolengui (closing the discussion). I am disappointed that those who have spoken in opposition to my paper

have presented such weak arguments, containing so little logic. I am glad to observe that Dr. Head and Dr. Summa evidently read my editorials. What they have said against process patents is not original. They have culled all their arguments from my editorials or from my addresses before the congressional Committee on Patents. But their present application of these arguments is illogical.

When the premise is sound, and the argument properly founded thereon, the deduction must be logical. But identically the same argument, used in connection with a false premise, is sophistical or illogical.

My own arguments against process patents have gone to prove them objectionable to such an extent that the government should not grant them at all. But these gentlemen, using my own arguments to show that certain process patents are objectionable, then make the deduction that such patents as have already been granted may be infringed, simply because they happen to be obnoxious to the dental profession. This is not only illogical, it is illegal.

The other gentlemen who have attempted to oppose my paper have not said anything worth answering, but I extend my thanks to those who have so ably supported me in this discussion.

Prophylactic Value of Potassium Sulfocyanate in Saliva.

By Dr. F. W. LOW, Buffalo, N. Y.

"WHAT'S IN A NAME?"—*Romeo and Juliet.*

TERMINOLOGY.

ZOÖGLEA, colonies of certain microbes embedded in a jelly-like matrix. *Plaque,* any patch or flat area. *Microbic* or *gelatinoid plaque* (Black), a patch or flat area found on the human tooth, differing from zoöglea in that it is a product evolved by the lactic acid bacteria instead of being a jelly-like matrix holding together a mixed or conglomerate mass of various microbic forms, plaques also being much more tenacious in their attachment to enamel surfaces than are zoöglea, and differing in other essential characteristics.

SOME EXPERIMENTAL RESULTS IN PLAQUE CULTIVATION.

Failure to appreciate the distinctive differences between variously propagated cultures of mouth bacteria, zoöglea often being studied under the impression that the plaque of Black is under observation, seems to be the stumblingblock to progress at present even more than when Dr. Black first made his announcement that he had succeeded, by poisoning the lactic acid bacteria—the tooth-decay producers—just to the right degree in artificial cultures, so that they produced therein the identical "gelatinoid plaque" which he had discerned upon enamel surfaces of the teeth where superficial enamel decay was rapidly taking place.

To the writer Dr. Black at one time complained that he had been disappointed whenever he had attempted to direct others regarding the artificial production of the true plaque; and the first year's experiment conducted by myself was a total failure—the worst part of the failure being that I labored under the impression that I had succeeded.

After having carefully packed and mailed two of my most promising culture tubes, imagine my disappointment when Dr. Black wrote me that unless they had been destroyed in transit, there had been no true plaque formations.

It was three years later that my successor to the chairmanship of the Committee on Scientific Research of the New York State Society, Dr. L. M. Waugh—after extended correspondence with Dr. Black, and with the more complete equipment afforded by the courtesy of the dental department of the University of Buffalo,

together with the employment of one of Buffalo's most competent and painstaking bacteriologists—succeeded where I had failed, because Dr. Roberts* *explicitly* followed instructions furnished by Dr. Black, and, out of the 116 tubes, 115 furnished abundant cultures.

EFFICIENCY OF POTASSIUM SULFOCYANATE IN RESTRAINING PLAQUE FORMATION.

In subjecting them to further treatment, the 115 tubes were so divided that 45 might be expected to develop plaques, and 70 might be expected *not* to do so.

Of the 45 tubes in which plaques might be expected to develop, 17 tubes fulfilled all expectations, making 38 per cent. Of the 70 tubes wherein plaques were expected *not* to develop, 66 tubes proved negative, this being 94 per cent. of the theoretically expected result, and Dr. Waugh reported that the addition of very slight—one might say almost homeopathic—tinctures of potassium sulfocyanate prevented plaque formation in culture tubes that were otherwise treated identically, so that its restraining influence should fairly be estimated as more than five to one.

The correctness of Dr. Waugh's estimate of the efficiency of potassium sulfocyanate in restraining plaque formation in artificial cultures depends first of all upon what we are disposed to call a gelatinoid or microbic plaque. I therefore asked Dr. Roberts to describe what it is that he sees in a culture tube that he would point out as being a true microbic plaque.

"A true microbic plaque," writes Dr. Roberts, "is a small rounded glistening body, about 1/32 of an inch (more or less) in diameter, adhering to the side of the test tube, or plate of glass immersed in the medium in the tube. This body is of a different index of refraction to the medium and can be seen only in the medium; it cannot be seen if the tube is inclined so as to uncover the plaque, but reappears when the medium again covers the plaque. These bodies cannot be distinguished in the masses of zoöglea forms found floating in the medium. They must be distinguished from crystals of calcium carbonate deposited from the spring water used to make the lamb broth."

Such is the character of the bodies that Dr. Black believes are responsible for rapid superficial enamel decay in the human tooth.

In Dr. Waugh's report, one of these bodies after having been properly stained and mounted was photomicrographed, his picture (Fig. 1, p. 1272) showing how accurately the bacteria found in its mass resemble those that Miller recognized as the lactic acid producers (see Fig. 2)—the bacteria of tooth decay.

PROFESSOR GIES' EXPERIMENTS.

Since Dr. Waugh's report, two eminent authorities have disputed his conclusions.

Prof. Wm. J. Gies of the laboratory of biological chemistry of Columbia University, New York city, experimenting for the Committee on Scientific Research of our New York State Society, succeeding Dr. Waugh, reported as his conclusion that potassium sulfocyanate had no inhibitory action on microbic plaque formation.

In the conduct of the experimentation projected by Prof. Gies, the method of

* Geo. F. Roberts, M.D., of Buffalo, N. Y., who has been a teacher of bacteriology in Michigan University, Niagara University, and Buffalo University.

making the media culture was identical with Dr. Black's. The deviations that followed in attempting to procure plaques were so considerable, and to the writer's mind so radically wrong, that Prof. Gies' conclusions were inevitably bound to be erroneous. The discrepancy in the two reports points out, I think, the most essential facts—namely, that Professor Gies made the same mistake the writer did during his first year's study, which was that zoöglea formations were confounded with and accounted as the true plaque of Black.*

* To comment on all the steps of Prof. Gies' experiments would make this paper too long and somewhat tedious. The writer contents himself therefore with submitting in the form of footnotes such adverse criticism as he has to make.

When Professor Gies attempted to enervate the bacteria to the point that they would seek self-protection by elaborating plaques under which their by-products might germinate lactic acid, he made his solutions of carbolic acid and cassia so strong that he completely destroyed the bacteria except in one instance, in which the addition of potassium sulfocyanate in some way saved his culture. When he used potassium sulfocyanate alone in his culture tubes, apparently laboring under the impression that it had been used by the former committee because of some supposed antiseptic property, he increased the strength of his tinctures over those used by Dr. Roberts, anywhere from four to fourteen times. Dr. Waugh had Dr. Roberts use potassium sulfocyanate tinctures in some of his culture tubes, not as an antiseptic with a view to enervating the bacterial growth, but, on the contrary, in very minute proportions with a view to stimulation so that the bacteria would not be affected by the enervating influence of carbolic acid and cassia solutions to which they were already being subjected.

When potassium sulfocyanate is naturally found in the saliva, it is the belief of the writer that it is because of some stimulating influence that the bacteria do not form plaques as they would otherwise.

It is greatly to be regretted that Prof. Gies did not have time to make and submit a series of lantern slides, so that the nature of the microbic life contained in what he conceived to be the plaque of Black might be preserved for comparative observation.

The writer of this paper, upon learning Prof. Gies' conclusions, made a journey to New York, was received most courteously by Prof. Gies, and was given opportunity to see a whole basketful of culture tubes. In only one, however, was I able to discern any bodies that answered to the description of a true microbic plaque as Dr. Roberts and as I believe Dr. Black would apprehend them; and even in this tube there were only three little glisteners, which quickly hid themselves in the zoöglea masses, so that even they could not be pointed out upon a subsequent attempt to bring them under observation.

Let no one understand from what has just been said that your essayist holds in light esteem the knowledge, integrity, or ability of Prof. Gies. Indeed, it is my opinion that work more recently accomplished by the eminent biologist, and reported in the March 1911 issue of the *Journal of Allied Societies,* is paramount in importance to all that has gone before concerning salivary analysis in relation to plaque formation. I only maintain that even the wisest man may sometimes be mistaken.

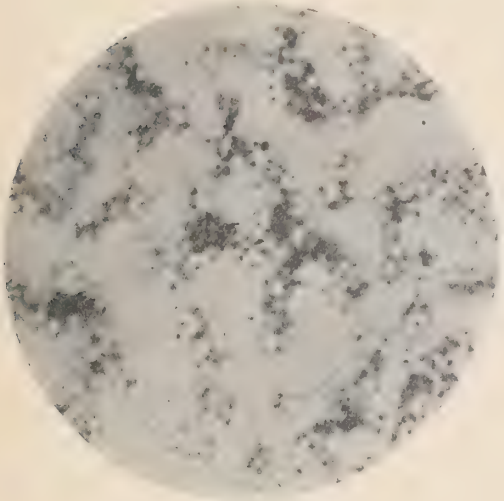
PROFESSOR KIRK'S THEORY ON THE ORIGIN OF BACTERIAL PLAQUES.

If he is mistaken, Prof. Gies is mistaken in good company, for it is Prof. E. C. Kirk whose promulgated theory, namely, that the origin of the bacterial plaque is mucinous, must next be scrutinized.

Professor Kirk must be taken to task for having said (*Dental Cosmos,* July 1910, p. 736) that, after reading the report of the Research Committee of our Empire State society, he wondered "whether with respect to plaque formation the committee had studied Black's communications on the subject, or if with respect to potassium sulfocyanate they had studied Miller's and Hugenschmidt's researches, which taken together cover the same ground, and to repeat which work would seem to be an unnecessary expenditure of effort, unless it was desired to cross-test the work of these preceding investigators." *

As to whether Professor Black and his writings were consulted, I think that the following extract from a letter by him to me dated February 16, 1910, may in a measure be permitted to bear witness. In this letter Dr. Black says: "The report made by Dr. Waugh regarding the action of sulfocyanate of potassium in limiting plaque formation is in line with some of my own experimentation, and I think I had a right to expect it. I am very much gratified with this report."

FIG. 1.



Dr. M. L. Waugh's slide (*Cosmos* 1910, p. 175).

FIG. 2.

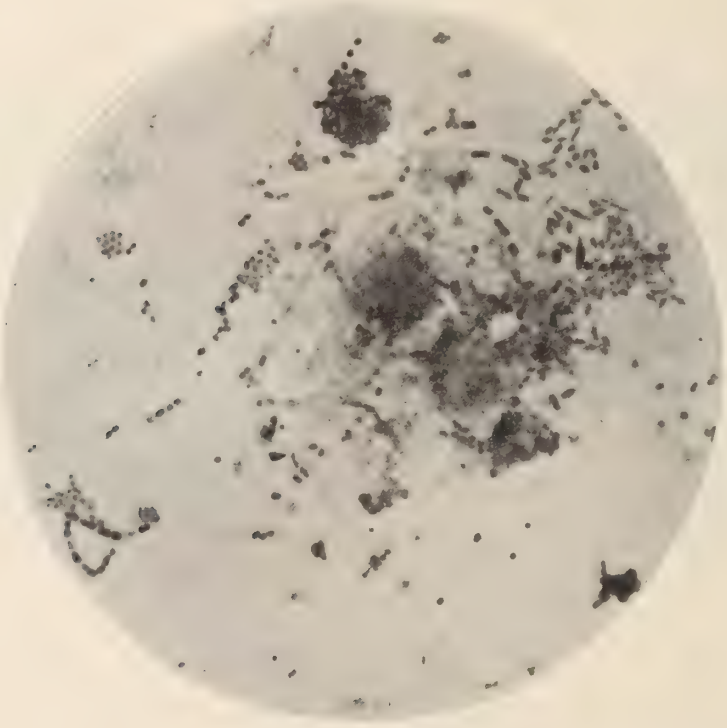
Prof. W. D. Miller's slide.

* Recent correspondence with Professor Kirk seems to show that his understanding of the contention of the Scientific Research Committee of the New York State Dental Society was that the abundant presence of potassium sulfocyanate in the saliva, or in artificial cultures, would prevent plaque formation because it possessed *antiseptic properties*—this being the same mistake as was made by Professor Gies. The committee never intended to be so understood; on the contrary, their contention was that its presence had a *stimulating* effect upon the bacteria, so that in consequence they were no longer compelled to elaborate their self-protecting gelatinoid smear to escape from the annoyance brought to bear upon them on account of that unknown something which was present in the salivas of susceptibles—which unknown something it was suspected *might be* the alkaline slimy mucin.

Regarding the researches of Miller and Hugenschmidt, the writer is not so certain; but if it ever was maintained—before the work of the Research Committee brought out the contention—that the luxuriant growth of the microbic plaque upon enamel surfaces of a human tooth was in any measure interfered with because of the presence of potassium sulfocyanate in the saliva, I should greatly like to know by whom, and when. It is true that Miller and perhaps others have said that potassium sulfocyanate did not hinder the development of bacteria, but the development of the plaques is an entirely different matter.

Concerning the mucinous origin of the microbic plaque, I believe that Professor Kirk has fallen into error. He says that it seems to him "that the precipitation of mucin among the lactic-acid-producing bacteria is a factor of plaque formation that ought not to be overlooked, because it furnishes a more direct and obvious explanation of that phenomenon than some of the suggestions already offered in this connection."

FIG. 3.



Illustrating Dr. Roberts' duplication of Prof. E. C. Kirk's experiment.

In substantiation of his mucinous theory, Professor Kirk offers in evidence a series of experiments by which, he claims, "The experimental production of the bacterial plaque has been successfully accomplished in the laboratory by inoculating with caries fungi a pabulum consisting of glucose and salivary mucin."

At the writer's instigation, Professor

Kirk's experiment has very recently been exactly duplicated in the city of Buffalo, but Dr. Roberts fails in his examination of the precipitated mass to discover any true plaque formations. (See Fig. 3.)

THE TRUE MICROBIC PLAQUE.

Fig. 3 shows a photomicrographic reproduction of the habitat of this sweet tooth pabulum, and Fig. 1 shows the character of the organism that Dr. Waugh found inhabiting what we, the former members of the New York State Society's committee, are willing to have designated as the true microbic plaque.

While in Fig. 3 there are undoubtedly many representatives of the lactic-acid-forming variety of bacteria, to the eye of your essayist there are present also many others which inhabit the mouth without assisting in any degree the rapid destruction of enamel. This specimen is magnified 1140 diameters.

Fig. 1, though magnified to 1600 diameters, shows nowhere near the amount of variation either in size or in shape of the different bacteria. It represents in the opinion of the writer what might be termed an *almost* pure culture. It represents the life existing in one of the little glistening, birdshot-like formations described in the earlier portion of this essay by Dr. Roberts as a true microbic plaque.

Though unable to prove it conclusively, I firmly believe that the lactic acid by-product from these little entities—all of the same breed—is much more concentrated, and much more harmful to tooth enamel.

Fig. 1 I believe to be a picture of the inhabitants of a true microbic plaque, while Fig. 3 is a picture of the variegated flora of the mouth, partly harmful, partly not, to tooth enamel, but all enmeshed, as claimed by Dr. Roberts, simply in a "gob" of rapidly decomposing precipitated mucin, concerning which formation it is my contention that, in the mouth, it would be readily washed off with an ordinary tooth-brush; that it would have no close attachment to tooth enamel—that no lactic-acid-producing fungi would be housed in it, so to speak, in a way to prevent the dilution of the destructive acid germinated. It is my contention that the mucinous conglomerate, so far as rapid superficial enamel decay is concerned, would be comparatively harmless.

Furthermore, it is my experience that these excessive mucinous conditions are always found accompanying a strongly *alkaline* saliva. It is quite true that in active practice I do occasionally find mucin precipitated on a tooth. Where this is the case I find in the mouth of the patient an angry purplish or red line following the thin edge of the gum adjacent to the tooth cervix, and tests for acid prove that from this angry-looking tissue there is a weeping-out of a thin or somewhat serous fluid which is acid in reaction. Just below where such conditions are seen there will be a little streak, yellowish brown in color, following the tooth about its cervix, consisting of an almost horn-like deposit, looking, as one might say, like a row of fly-specks. Yet, month after month, I have cleaned off these deposits with moistened flour of pumice on little wooden sticks, while *almost never* is there any superficial enamel decay manifested under the streaks. I am therefore forced to the conclusion that mucin precipitated by acid is not an ideal medium for the lactic-acid-producing bacteria of decay to increase and multiply in.

HARMFUL EFFECT OF EXCESSIVE MUCIN IN SALIVA.

I am a firm believer in the harmful effect of excessive mucin in saliva, but this is my theory of the manner in which the mischief is accomplished:

In alkaline saliva, the mucin not being precipitated, is manifested as a ropy, slimy medium, in which, naturally, the lactic-acid-forming bacteria are held in somewhat close proximity to the most vulnerable points of contact about the decaying teeth. Again, naturally, these lactic-acid-producers would scarcely thrive, bathed as they are in this alkaline slime. Consequently, they are induced, in such presence, to manufacture into the true microbic plaque such by-products as are not appropriated by their own bodies.

In one of his letters to me Dr. Black most aptly says: "One of the very strange things to me has been the slowness of men to understand that caries fungus, in order to produce caries of enamel, must be housed, so to speak—placed in a position in which the acid formed will not be directly washed away by the saliva."

Concerning the mucinous origin of the microbic plaque in test-tube cultures, one circumstance connected with Dr. Waugh's experiments has direct bearing, and it seems to me that it goes to prove that Professor Kirk's theory of plaque formation is untenable.

A SIGNIFICANT TEST.

To 100 cc. of sterile lamb broth in a flask, 15 cc. of a mixture of saliva and carious dentin were added. This incorporated but a small percentage of salivary mucin. Following incubation, less than half a cubic centimeter of this concoction was transplanted into uncontaminated lamb broth culture tubes containing 10 cc. each of broth that was tinctured with weak solutions of carbolic acid or cassia.

From such a combination, where did the abundant plaque growths, subsequently seen in many of these tubes, find sufficient mucin to bring about these formations? They surely could not be accounted for by the mere fractional quantities of mucin thus carried over;—no, but rather they resulted from the by-products of bacterial action on the lamb broth.

What made the bacteria so act in these test tubes? Why, the weak solutions of either carbolic acid or cassia balked them sufficiently—just as strongly alkaline, thick and ropy mucinous saliva has a similar influence in certain mouths—and the glistening, tenacious, transparent, bird-shot-like formation, from which one of our interesting photomicrographs was made (and which Dr. Waugh reported as being so difficult to dislodge from the side of the test tube from which it was transplanted) was the consequent result.

DIRECTIONS FOR PLAQUE EXPERIMENTS.

If the reading of this paper has awakened sufficient interest so that there be among you one who will try for himself to demonstrate the difference between the mucin patch, zoöglea, and the microbic plaque, I shall feel fully repaid for my time, trouble, and effort in compiling it. To such an investigator I would suggest the following experiment: He should select from his patients one in whose mouth rapid enamel decay is working the greatest ravages, protect the lips and gums with cottonoid rolls, and stain one or more incisors with the following prescription:

℞—Iodin,	gr. 45
Potass. iodid,	
Zinc iodid,	āā gr. 15
Glycerin,	
Aqua,	āā ℥ss

Sig.—Staining mixture.

The staining should be done rather sparingly, using the merest shred of cotton on a wooden toothpick-point. When the stain has dried a little, the consequences must be observed. Many spots will be noticed where the stain appears more deep, giving the tooth surface a somewhat mottled appearance. The stain is then washed off with a jet of tepid water, using for the purpose the ordinary mouth syringe. Thus any mucin patches present are disposed of.

The teeth are then dried without undue rubbing, and stained again, and it will be noticed that there are still many mottled spots, though not quite so many as before. The patient is then required to *brush* the teeth in the researcher's presence, the staining is done as before, and it can be realized that the brush has removed the jelly-like zoöglea.

A few of the deepest stains will still persist in showing. These are the true microbic plaques, and underneath them concentrated lactic acid is doing its deadly work, and the bacteria of decay are active in their natural enviroment.

Even moistened wooden sticks dipped in the flour of pumice must be forcibly and persistently used, in order to dislodge these bold marauders. If any surface of enamel is slightly roughened, carborundum followed by Arkansas stones may have to be employed in the prophylactic work.

Up to this point the investigations proper are only half accomplished. It is yet to be determined what the persistent presence of potassium sulfocyanate in the saliva of such a mouth may be able to accomplish.

A recess of a month, while medicine is being taken, is necessary at this stage; then should come a repetition of the iodin staining process.

The correctness of my contention that the constant presence of potassium sulfocyanate in the saliva exerts restraining influences on luxuriant plaque formations will be demonstrated only if this second staining experiment convinces the investigator that the plaques on such a patient's teeth are less extensive and less tenacious than they were before the systemic treatment.

And now, after thus propounding the case, the matter is left to my fellow investigators to judge.

CONCLUDING REMARKS.

When all investigators correctly differentiate between mucinous masses, zoöglea patches, and microbic plaques, the motto placed at the head of this paper —*What's in a name?*—will be conceded to have important bearings on biological research concerning the dominant cause of rapid superficial enamel decay occurring in human teeth.

The search for *chemical elements* in saliva accusable of producing tooth decay, so far has proved a bootless search. In the opinion of the essayist this will always be so, unless it shall be found that the plaque-forming habit of lactic acid bacteria is sometimes encouraged, at other times discouraged, by this or that fickle, peculiar, elusive, and complicated chemistry concerning which we really know so little, but which with almost kaleidoscopic frequency is varying and ever changing in every human mouth.

Shall chemical research and analysis

of the saliva be therefore abandoned? Emphatically *No!* Truths equally important to that of the discovery of the cause of tooth decay may be awaiting elucidation, and the biological study of saliva is and will be greatly dependent upon more accurate chemical knowledge concerning it.

In conclusion, I wish to make most grateful acknowledgments to Professors Kirk and Black for recent correspondence containing valuable hints and suggestions; also to Professors Waugh, Bunting, and Ward, and to Dr. Roberts and Mr. Averill for valuable assistance.

Discussion.

Dr. R. W. Bunting, Ann Arbor, Mich. While conversing with Dr. W. D. Miller a short time before his death, I asked him what he considered the most promising field for research along the scientific lines of dentistry. In reply he said in substance that the most important work of today was the discovery of some method or principle by which caries of the teeth could be controlled, and which would be within the reach of the poor people. This assertion is being corroborated by a large number of investigators, who are working on many and diverse lines, all with this end in view.

Since the work of Miller and Williams, it has been conceded that the process of caries is that of decalcification by lactic acid produced by bacteria acting under a plaque. Thus far all agree, but as to the question why caries is so active in some mouths and is absent in others, a great diversity of opinions and theories have been advanced. Investigation and research has been carried on along many lines with reference to this question, but chiefly attention has been turned toward the chemical and physicial properties of the saliva, seeking in it the variable principle which determines the proneness of the teeth to decay.

In pursuance of this question many of the properties have been investigated individually, and an attempt has been made to determine whether or not there is any connection between the presence or absence of these principles and the presence or absence of caries.

Among the principles investigated have been the acids, the foodstuffs, mucin, potassium sulfocyanate, its formula being KCNS, ptyalin, saline chlorids, bacteria, etc., each being the basis of a separate theory by which some have attempted to explain the manifestations of immunity and susceptibility to caries. Many of these theories have been exploded by painstaking researches, which seem to have proved without doubt that these theoretical agents are not responsible to any large extent. Of the theories which are today considered tenable, the one which has received the most attention is that of the KCNS content, whose champion and greatest promoter we have had the pleasure of listening to tonight.

Great credit should be given Dr. Low and his *confrères*, who in the investigation of this compound have made so many salivary analyses and carried on so many experiments that their work has become recognized the world over. The statement of Dr. Low made in 1904 relative to the therapeutic value of KCNS has by its startling nature produced a storm of comment and criticism, and by this very fact has been one of the greatest factors in the stimulation of interest in salivary analysis. Whatever be the final outcome of the investigation, it must be conceded that these men have greatly advanced the knowledge of the saliva by the

enthusiasm for its study which they have created among the profession.

The history of the KCNS theory is familiar to all here today. We all know of the assertion, which was first made by Dr. Low, that it was always found in the salivas of immunes, and seldom in that of susceptibles, that KCNS given internally would quickly appear in the saliva, and if taken continuously would produce a condition of immunity to caries in cases of individuals normally susceptible by preventing the formation of plaques. The announcement of this theory led many to investigate the matter for themselves, and of these some agreed with Dr. Low, while others claimed that their results did not point to his conclusion. Many misunderstood the theory, thinking that an antiseptic value was claimed for KCNS, and contested it upon this ground. Dr. Waugh, in conjunction with Dr. Low, succeeded in growing the plaques artificially, and claimed that when he treated the media with small quantities of KCNS, the plaques did not form. His work was repeated by Dr. Gies of Columbia, and in his report to the New York Society he claimed that KCNS in the quantities found in the mouth has no effect upon plaque formation, and further makes the statement that, in his opinion, no fractional part of saliva bears any relation to the amount of caries in the teeth of that individual. Tonight we have heard the latest word in the controversy, in which Dr. Low defends his original statement, and pleads for further investigation of the subject.

The investigation of the saliva and its relation to caries is a most complex problem. In the first place, as Dr. Low says, "What is a plaque?" When we look at the cross-sections of teeth which Dr. Williams has published, we cannot deny the actual presence of the plaque or its relation to caries, but few of us can clinically pick up and examine such a plaque to our own satisfaction. They are extremely thin transparent bodies which offer a great deal of difficulty to study or experimentation.

Then, too, the saliva is a complex biochemical compound offering many difficulties to an accurate analysis of its component parts. Saliva is primarily a bodily secretion, but is modified by the foodstuffs taken into the mouth and the products of bacterial action which may take place in it or upon the tissues. We have, then, the variations in the proportions of the ingredients of the secretions, which may change from time to time owing to conditions in the bodily metabolism, changes in the quality of food ingested and in the amounts which remain in the mouth owing to the perfection or imperfection of the oral hygiene, and lastly, variations in the amounts and character of the infections present. All of these render the qualitative or quantitative determination of any of the salivary compounds an extremely difficult task. For instance, our tests for acidity are far from satisfactory; perhaps the best reagent we have for this purpose is phenol-phthalein, but in many cases the turbidity of the fluids or the presence of certain substances renders an accurate titration impossible. So also the test for KCNS, which is regularly used, is ferric chlorid added directly to the saliva, but, as I have shown in the December 1910 issue of the *Dental Cosmos,* this test may be positive when there is no KCNS present, *i.e.* the ferric chlorid in a water solution is not a specific test in the saliva.

Moreover, in the taking of statistics, upon which we must finally depend for the verification of our observations, the

greatest variance may occur, and opportunities for error are everywhere present. For instance, how do we know when a mouth is immune? We may say that a mouth is immune when there has been no new caries for one year, but we all know that an immune mouth may become susceptible at any time, and who can say by the appearance of a mouth whether it is still immune or has—within, let us say, the past week—changed to a condition of susceptibility? The salivary conditions will probably be different to the immune, but the appearance of the mouth as presented to the investigator will not change until sufficient time shall have elapsed to produce carious defects in the teeth. Then let us take the converse of the proposition: Given a mouth with a large number of cavities which are unfilled, is such a case always susceptible? Is it not possible that the salivary conditions may have changed to those of the immune character, and that if we fill all these cavities properly the patient may become truly immune and remain so for several years? Have we not all of us seen just such cases?

I do not bring up all these difficulties in the spirit of a pessimist, for, on the contrary, I am exceedingly hopeful that before long we shall arrive at a more exact knowledge of the principles involved. This is a great problem and worthy of our best thought and attention. More experimentation and observations should be carried on, and our best chemical experts should be engaged in the study of this unknown and changeable compound. But unless the investigations are carried out entirely under the supervision of a trained dental observer, many errors may creep into the results. I again wish to express my personal appreciation of what Dr. Low has done, and hope that he may continue the good work which he has begun.

Dr. M. L. Ward, Ann Arbor, Mich. It seems quite obvious that the principal object of the paper under consideration is to defend previous statements made by the writer and the work of the Research Committee of the New York State Dental Society. Dr. Low comments on his own work and praises that of Dr. Waugh and Dr. Roberts, after which he seeks to explain the reason why Professor Gies reported that "KCNS had no inhibiting action on microbic plaque formation." Dr. Low criticizes the work of Professor Gies very kindly, and states that if he is mistaken, he is mistaken in good company, inasmuch as Prof. E. C. Kirk, for promulgating the theory that the origin of the bacterial plaque is mucinous, must next be taken to task—though he somewhat unreservedly states that Professor Gies is mistaken, and implies that Dr. Kirk is likewise mistaken. I do not presume to discuss this paper from the standpoint of work done on this particular subject, but to present the views of one who has watched the work of these men and done some work along allied lines. Of course, the evidence that Dr. Low presents in support of the theory that KCNS inhibits "luxuriant growth of the microbic plaque upon enamel surfaces of the human tooth" is in his favor, but if the scores who have pursued the administration of this drug with the expectation that they would secure at least partial immunity to caries could testify here, I fear we would agree, not quite with Professor Gies that KCNS had no inhibiting action on microbic plaque formation, but that at least the quantities of the drug suggested by the Research Committee of the New York Society had little or no effect upon the luxuriant

growth of the microbic plaque. I do not mean to state that Dr. Low is wrong nor that Professor Gies is wrong, but merely that it would seem that this is not the time to form opinions regarding the action of this drug, much less to say that anyone is mistaken. Dr. Low states this time that KCNS inhibits the luxuriant growth of the microbic plaque. It would seem that this was somewhat of an admission that the use of the drug in question had not met his expectations. Whether or not this was his intention when he made this statement I do not know, but it certainly seems appropriate in view of the evidence. If the question were asked of those familiar with qualitative and quantitative analyses, if KCNS would inhibit plaque formation, I think the answer would invariably be "It may do it part of the time," for the reason that such men would appreciate that a given reagent produces like results only under like and known conditions. The thing of paramount interest to such men is, What is present with a given reagent? and oftentimes, How much of it is present?

To such men, to whom the catalytic accelerating and catalytic retarding effect of certain simpler substances is well known, to say nothing of such a complex substance as the saliva, I think the contention of Professor Gies that KCNS has no inhibitory action upon microbic plaque formation appears quite as rational as the previous and opposite contention of Dr. Low. Do Dr. Low or his *confrères* know exactly what is in the average saliva, and in what quantities each constituent appears? If they do not, they are not in a position to state that KCNS inhibits microbic plaque formation in all cases, whether such growth be luxuriant or not. If they do know just what is and is not in the saliva, why do they permit the contention of Dr. D. W. Bunting (*Dental Cosmos,* December 1910), that "There is something in the saliva other than KCNS which will react with ferric chlorid and give the KCNS test," to go unchallenged at this very opportune time? Why do they not show him, too, where he is mistaken, in the same manner that they presume to do with Professor Gies and with Dr. Kirk regarding the origin of the microbic plaque? There can be little question that the work of Dr. Bunting bears the same relation to the work of the New York Research Committee as did the editorial of Dr. Kirk (*Dental Cosmos,* April 1907) to the work of Miller on erosion, yet it is not mentioned at this time by Dr. Low. Dr. Bunting suggests that the KCNS test may be had, and yet there may be no KCNS present; while Dr. Kirk showed that both acid and basic sodium salts could also exist in the saliva without one neutralizing the other—in other words, a saliva may show both acid and basic reactions.

Aside from the work of these two men —and several others could be named— showing the complications which may arise in work on the saliva, I want to mention that apparent inherent quality of the saliva which almost everyone who has worked on the soluble filling materials has observed, viz, its restraining action. Dr. Joseph Head published some experimental data on the inlay cement line (*Dental Cosmos,* August 1908), which was somewhat of a relief to most of us who were working on filling materials, especially the soluble ones. He said in part:

> At last, after carrying on innumerable tests with solutions at blood temperature, I found that the source of error lay in the use of watery solutions; that saliva solu-

tions should be used if results approximating those found in the mouth were to be obtained. I found that saliva has a restraining action on the decalcifying action of acids contained within it, and that the saliva of different persons varies markedly in this restraining power. I also found evidence to indicate that the saliva of an individual might vary in this power from day to day or week to week. For instance, 1:500 lactic acid and water in half an hour will turn tooth-enamel white; 1:500 lactic acid and one saliva that I tested, although it turned blue litmus paper brilliantly red and had a sharp acid taste, preserved tooth-enamel for days or even weeks unharmed. At other times this same saliva, in solutions of from 1:800 to 1:1000 would not be able to protect enamel from decalcification for any length of time. It was also discovered that in saliva solutions the cement was less protected from acid decalcification than was the enamel; it was, too, noted that some salivas were much better protectives for cement than others. For instance, a 1:1000 solution of lactic acid and one saliva would steadily dissolve cement, while it would not dissolve tooth-enamel. A 1:500 lactic acid solution with another saliva would protect both tooth-enamel and cement; and as a further interesting fact, cement lasts extremely well in the mouth from which this latter saliva was derived. And so the problem of what fluids to use in these cement-dissolving tests was solved by using saliva solutions of lactic acid.

Dr. Head in his concluding remarks says:

Whether the KCNS or the phosphates of soda and calcium are to be credited with this acid-restraining power, or whether this power is purely a property of saliva as a living fluid, will in time probably be demonstrated.

It may be seen from this that Dr. Head regards the restraining power of saliva as proved, though he does not venture to say to what this is due. If two substances that combine as easily as phosphorus and oxygen can be prevented from combination by the very smallest percentage of oils, alcohol, chloroform, etc.; if a substance as easily decomposed as hydrogen dioxid can be retarded in its action by the addition of a very little acetanilid, or the decomposition of ferric iodid can be retarded by the addition of a little citric acid, can we doubt the restraining power of many organic substances? Can we make ourselves believe that a small amount of lactic acid will dissolve cement or enamel, or that KCNS will inhibit plaque formation every time it is present when suspended in such a substance as saliva? It certainly looks unlikely, and of the two suggestions made by Dr. Head, the latter seems to be the more feasible.

What has been said of the restraining power of certain reagents and of the saliva I think need not be confined in its application to the use of KCNS, as suggested by Dr. Low, nor of the lactic acid as used by Dr. Head. I firmly believe that it is an innate characteristic of certain salivas and of others at certain times to be as much of a restrainer to the action of many reagents as a good lubricating oil would be.

Dr. Low (closing the discussion). I shall detain you but a short time. I only hold that potassium sulfocyanate helps. I know there are a thousand things that we do not know about, and I believe Dr. Bunting will agree with me that there are instances in which sulfocyanate may appear to be in the saliva, when in reality it is not found when the test is made with perchlorid of iron. I say that the test is not so valuable as a positive test as it is as a negative one.

Dr. Bunting stated that I said that wherever there is an absence of sulfocyanate we shall find caries. These are not exactly my words. There are a few cases of rapid decay, not superficial caries,

where something else must yet be discovered to account for it, but these cases are comparatively very few. I am not finding any fault with Professor Gies. He is very skilful, and I am only an old Indian who is simply following the trail and trying to point the way. I am sometimes ashamed to essay to say anything on this subject, but someone has to play the part of the old Indian, or else we will not have scientists to do work which is necessary. Dr. Gies made the mistake of using such strong carbolic acid solutions that they destroyed all kinds of growth in his cultures, and he employed thirteen times as much potassium sulfocyanate as was used in our experiments. Why did he do that? Simply because he reasoned like the patient who thought that if one pill would do a little good, the whole box taken at one time ought to cure him immediately. He was suspecting that the potassium sulfocyanate had an antiseptic influence on bacteria, and herein he made a mistake. If a patient is given strychnin in doses of a thirtieth of a grain, it will act as a stimulant, but if he is given thirteen times that much, it will kill him. This year Dr. Gies has changed his working method. He sent glass-stoppered receptacles to some of the best practitioners in New York, and asked them to furnish him with saliva of patients in whose mouths rapid superficial enamel caries was going on, and also saliva from the mouths of other patients who were remarkably immune. He took these, and from two hundred tests made his tabulations show that in the mouths of immunes potassium sulfocyanate was present in twice the quantity as in the susceptibles. I claim that Dr. Gies in his own report concerning these cases published in the *Journal of the Allied Societies* proves my contention. He selected thirty students promiscuously, hailing anywhere from Oshkosh to Kalamazoo, and depended upon these boys to diagnose their own cases as to whether they were immunes or susceptibles. The true histories of these cases were not known. In these mouths he did not find any such proofs as he had found in the mouths of the patients of the dentists who had diagnosed whether the patients were immune or not, and I believe Dr. Ward would agree with me in claiming that in those thirty cases no one could tell from the clinical evidence whether the subject was immune or susceptible.

Report of Committee on Scientific Research.

By HENRY C. FERRIS, D.D.S., New York, N. Y.

IN accordance with the plan of procedure outlined in its report two years ago, your committee has proceeded with its research to record the normal physiological changes which take place in the organ of mastication, and we believe we have improved our information both theoretically and practically, and feel that we are in a better position to study the pathological conditions involved.

PROFESSOR PAWLOV'S STUDIES ON THE SECRETORY GLANDS IN DOGS.

We will try to summarize our results and give as much of our findings as we can in the time allotted. That the physiological consideration of the organ of mastication of man has been overlooked in the majority of the text-books, and by the most advanced physiological workers in the world's laboratories, is evident. The latest reports, however, show that a great deal of thought has been devoted to the subject by Professor Pawlov and his assistants in their work on the secretory glands, and in accordance with their ideal methods of collecting the pure product of each of the large glands, they have given us food for thought.

Professor Pawlov selected the dog for his material, and his findings, as they bear upon our region, will have to be taken in terms of the dog, it being a carnivorous animal with the least amount of enzymic ferment in its saliva, which is in proportion to its specialized teeth and its food; and while Professor Pawlov has shown how the nerves select the different kinds of saliva for the special food for this animal, he apparently leaves this intricate mechanism without considering its muscular function, with the nerve centers stimulated thereby, and goes to the stomach and duodenum to study the digestion of food.

THE ORGAN OF MASTICATION IN MAN.

The organ of mastication in man has thirty-two teeth and 134 inclined planes in contact when in normal occlusion, the teeth being specialized for special foods, and operated by muscles with power that is only second to those of the heart. The roots of these teeth are slung in their sockets by a peridental membrane of white inelastic tissues which are supplied by one of the cranial nerves intimately connected with the general nervous system.

The muscles of mastication in a normal subject will exert a pressure of from 100 to 200 pounds upon the first molars.

It is reasonable to believe that this stimulus during normal function will bring about the highest degree of physiological action in the glands of the organ, and, if the gustatory nerve of the dog when stimulated by food on its tongue produces a primary flow of the gastric juice, we may assume that the reflex produced through this function would be a factor equal if not exceeding that of the sense of taste in stimulating these secretions. Experiments to illustrate this point will be shown later.

TECHNIQUE OF SALIVARY ANALYSIS.

Your committee in undertaking this study are cognizant of the variability in findings, incident upon temperament and physical conditions, and realize that the physiological limits of each of the properties of the masticatory organ have not been established in man, but we hope that our results may lead to a better understanding of the subject.

We have improved our technique for salivary analysis, thereby making our findings more accurate and in accordance with those of the workers in the physiological fields. We are pleased to give credit to the men in our country who have carried out a series of investigations upon the technique, and have improved our information by eliminating errors and elaborating upon special subjects. I have reference to Drs. Russell W. Bunting of Ann Arbor, Michigan, and Percy R. Howe of Boston, Mass., and will take up their subjects later.

We will not take up your time in detailing all our experiments, or give reasons for the correction of the technique, but will publish in full our method of procedure, in order that our findings may be duplicated by those interested in this field.

TAKING SALIVA SPECIMENS.

Our method of procedure and technique is as follows: The subjects are seated in a room by themselves, without odors of drugs, cooking, or irritating noises. A history of chronic diseases, both organic and of the head and neck, is recorded. The mouth is then examined, first for occlusion and for missing teeth, as to cusps and artificial crowns, and the number of occlusal inclined planes is noted; then the pathological condition of the soft tissues—the gums, cheeks, lips, tongue, and roof and floor of the mouth —is examined.

They are then provided with a white porcelain cup marked with a black line for 20 cc., and are requested to expectorate the saliva as fast as it flows into the mouth without swallowing. They are handed a magazine to read and told that the time of the delivery of this measured quantity is being recorded. This direction is important, as this finding will be found diagnostic, within physiological limits, of the fluidity of the blood stream, and parallel with the daily consumption of water. The time of delivery will be found to be variable from twenty minutes to one hour and a half. When the 20 cc. is delivered the patient is excused, the specimen sent to the laboratory, and the consistence is immediately recorded, as follows:

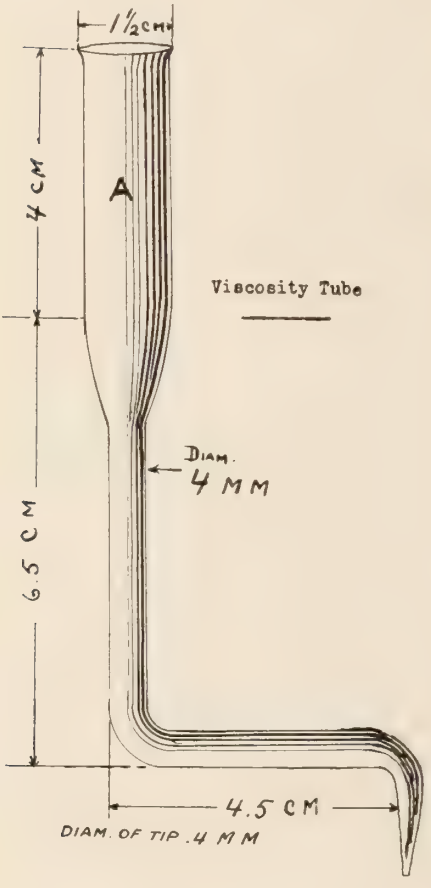
Revised Technique of Salivary Analysis.

CONSISTENCE.

Immediately upon delivery of the specimen the saliva is well mixed by pouring several times into another tube. A portion, 5 cc., is poured into a viscosity tube, the air-bubbles are blown out of the tip, the tube is placed in the rack, and the time required for twenty drops to fall is observed. For the sake of accuracy, the time required for a second series of 20 drops, immediately after

the first reading, is also observed. If there is much variation, the viscidity tube is rinsed twice with distilled water and a new examination is made with another 5 cc. portion of saliva.

Notes. For very viscid saliva, the number of drops per minute may be observed, and the time of 20 drops calculated.



For saliva containing so much sediment that particles might lodge in the tip, the viscidity of the supernatant liquid after centrifuging may be observed and recorded.

The viscidity decreases rapidly after the saliva has left the mouth, so that this test should be completed within one hour of delivery.

SPECIFIC GRAVITY.

Mix the specimen well by pouring several times into another tube; then rapidly fill the bulb of a Ferris' modified Saxe hydrometer. Cool the whole to 70° F., then use a cotton batting roll to remove any bubbles of saliva, and lower the surface of the liquid until the meniscus just touches the line. Insert the stopper and immerse the hydrometer in distilled water at 70° F. so that no air-bubbles adhere to it, and read the specific gravity as given on the stem of the hydrometer. Spin the hydrometer and read again to verify the first reading.

Normal = 1.002 to 1.004.

[*Note.* It has been observed that the minus readings reported two years ago have been accounted for by the neglect to correct the temperature of the specimen to 70° F. before introducing it into the cylinder.]

ENZYMIC ACTION (GLINSKI-WALTHER METHOD).

Preparation of starch paste. Put 15 cc. of distilled water to boil. Meanwhile weigh out 3 gm. sterile starch and mix with 6 cc. cold distilled water. Add drop by drop under constant stirring to the boiling water, then rinse out any particles of starch adhering to the dish with 5 cc. of distilled water and add to the boiling starch solution. Boil one minute under constant stirring. Cool to blood temperature and add gradually 4 cc. of N/100 iodin solution.

This makes 30 cc. of a 10 per cent. starch solution, which, when colored, is of a dark blue, and can be kept several days in the ice-box.

Filling the tubes. Suck up the paste into glass tubes of 1.5 mm. diameter and cool in the ice-box. Just before using, make a file mark 1 cm. from the end of the tube and break off the piece of tubing so that it is full of the blue starch paste. Be sure that this small tube is broken so as to leave each end square and full of paste. Examine under low-power microscope.

Experiment. Immediately after delivery of the specimen, measure 2 cc. of saliva into a test tube. Place in it the small tube of starch paste, and heat the whole in a thermostat (from 37° to 38° C.) for half an hour. The enzyme of the saliva will dissolve the paste from the ends of the tube, leaving a blue column of paste unchanged in the center of the glass tube. After half an hour measure with a micrometer gage the total length of the tube, and the length of the blue starch paste column remaining undissolved. The difference between these two measurements represents the amount of starch digested by the enzyme. Since the quantity of ferment in any fluid varies with the square of the length of the column digested, the quantity of ferment in the saliva

is found by squaring this difference. Multiply by 100 to give the enzymic index.

PROTEOLYTIC TEST.

Reagent. Dissolve 1 dgm. of casein (c. p.) and 1 gm. sodium carbonate in 1 liter of distilled water. Mix ½ cc. Fehling's copper solution and 5 cc. Fehling's alkaline solution, and add the mixture to 94 cc. of the first solution. The color will be a light blue.

Heat 5 cc. of the reagent in the thermostat at from 37° to 38° C. Then add ½ cc. saliva, and watch the color. If there is a strong reaction, the color will turn pink in five seconds, indicating the presence of a peptone. If the reaction is medium, a lavender color will result, indicating albumin. If there is no reaction, the color will remain a dirty blue, and will indicate unsplit casein.

ACIDITY AND ORGANIC MATTER—OR AMINO-ACIDS RECORDED AS AMMONIA.

Add 1 drop of neutralized 1 per cent. solution of phenol-phthalein in alcohol to 2½ cc. saliva, and titrate with N/40 NaOH solution to a permanent color of faintest pink. Ten times the number of cc. of NaOH used gives the acid index, since N/40 : N :: 2.5 cc. : 100 cc., and the acidity is expressed in parts per liter (1000 cc.).

Now add to the above 1 cc. of neutralized formalin. The pink color disappears, because the formalin splits off ammonia from the organic matter, liberating free acids. Titrate again to find the amount of combined acids thus liberated, and multiply the reading by 10 as before.

Total acidity is obtained by adding the two findings.

Amino-acids calculated as ammonia may be obtained by multiplying the second findings by 0.017.

PRECIPITATES.

I. Centrifuge 10 cc. of the specimen of the saliva for three minutes in a tube graduated to 40ths. Record the amount, percentage, and color of the sediment. Pour off and save the supernatant fluid, record its appearance.

II. To the precipitate add 10 cc. of lime-water, shake vigorously, and let stand for five minutes. Shake again and centrifuge. The difference between the total sediment and this reading gives the amount of mucin and nuclear albumin which the lime-water has dissolved. Record the percentage of the mucin in the sediment.

III. To 2 cc. of the fluid saved from "I" add 8 cc. distilled water. A cloudy appearance indicates the presence of globulin. Centrifuge, and record the amount.

IV. (*a*) To the fluid remaining from "II" add ten drops of glacial acetic acid. A precipitate indicates dissolved mucin. Centrifuge, and record the amount and percentage of mucin.

(*b*) If the saliva is thin, and if it gives only a trace of dissolved mucin which settles easily, repeat, using the whole of the liquid remaining from "I." Save the liquid, and subtract the amount of globulin from the percentage of precipitated mucin.

(*c*) If the saliva is viscid, and if it becomes cloudy in (*a*) without the separation of a precipitate, take 2.5 cc. of the liquid remaining from "I," add 7.5 cc. neutralized 95 per cent. alcohol, shake well, and let stand for five minutes. Then centrifuge, and record the amount of dissolved proteids in the saliva. Pour off and save the liquid.

Then add lime-water to the precipitate, shake well, let stand for two or three hours, and centrifuge to determine the amount of mucin dissolved from this precipitate.

V. (*a*) To the liquid remaining from "IV (*a*)" or "IV (*b*)" add 1 cc. of 10 per cent. solution of potassium ferrocyanid. If albumin is present the specimen will become cloudy. Centrifuge as before, and record the quantity of albumin.

(*b*) To the liquid remaining from "IV (*c*)" add 1 cc. nitric acid to see if there be a precipitate.

Also to the liquid in "IV (*a*)," when the precipitate will not settle, add 1 cc. of 10 per cent. solution of potassium ferrocyanid, and centrifuge. Subtract the amount of mucin found in "IV (*c*)" to find the quantity of albumin.

THIOCYANATES.

Use a colorimetric scale (Ferris and Schradieck), 1 cc. of the specimen in tube A, 1 cc. of 1 : 2000 ammonia sulfocyanate in tube B; add two drops of a 5 per cent. ferric chlorid solution to each tube, add aqua destillata in tube B, until its color matches that of the specimen. Read the scale in thousandths and ten-thousandths.

Care must be taken to have the bottom of the meniscus on the line. If these tubes are introduced in the colorimeter, the readings can be made more accurately.

If, later, diacetic acid ester is found, a correction is made in the finding.

CHLORIN.

To 1 cc. of the specimen add 4 cc. of chlorin, free distilled water and 2 or 3 drops of potassium chromate; then titrate with N/40 silver nitrate solution, until the first appearance of a permanent reddish tinge. Multiply the number of cc. of silver nitrate used by 0.0886 to find the amount of chlorin.

DIACETIC ACID (ARNOLD-LIPLIAWSKY REACTION).

Reagents. (*a*) A 1 per cent. solution of potassium nitrate. (*b*) To 1 gm. para-amido-acetophenon dissolved in 1 cc. distilled water, add about 2 cc. concentrated hydrochloric acid, drop by drop, until the solution becomes colorless.

Just before using, mix 1 part of (*a*) with 2 parts of (*b*).

Experiment. Add 1 cc. of the mixed reagent to 1 cc. of saliva, and add one or two drops of concentrated ammonia. A brick-red color results.

To this solution add from 10 to 20 cc. of hydrochloric acid (sp. gr. 1.19), 3 cc. of chloroform, and from two to four drops of ferric chlorid, and carefully mix without much shaking.

If diacetic acid or indican is present the chloroform becomes violet or blue; if absent, yellow or red. This test detects 1 in 25,000 parts of the acid.

UREA.

Reagent. Put 12 gm. of bromin and 12 gm. of potassium bromid in 100 gm. of distilled water.

Fill the tube of a Ferris' modified Doremus ureometer with a saturated salt solution. Close the stopper, and add 1 cc. of saliva to the upper tube. Allow this to run through the stopper carefully, then close, and add 1 cc. of the reagent. When this has gone through, close the stopper quickly, set up the apparatus and allow to stand one hour or longer. Then by gently tapping cause any bubbles adhering to the sides of the tube to rise to the top, and read the amount of gas collected. Each division represents 0.025.

OXYDASE.

Take 1 cc. of saliva, 4 cc. of aqua destillata, 12 drops of a 10 per cent. solution of H_2SO_4, then mix and add drop by drop 0.5 per cent. water solution of metaphenylendiamin. If there is no oxydase, it stays without color. If there is an oxydase, there is formed triaminphenylin, which makes the solution strongly yellow. Compare the color formed with 4 drops and 10 drops standard in aqua destillata.

POTASSIUM BASE (BERNARD R. LEROY).

To 1 cc. of the centrifuged specimen, add 1 cc. of 95 per cent. alcohol and 1 drop of a 5 per cent. solution of platinum chlorid. A precipitate shows the presence of a potassium base. Centrifuge to determine the relative amount.

SODIUM BASE (BERNARD R. LE ROY).

To 1 cc. of the centrifuged specimen, add one drop of a saturated water solution of potassium antimonate. A precipitate indicates the presence of sodium. Centrifuge to determine the amount, and compare with the potassium, reporting the stronger base.

TOTAL SOLIDS AND ASH.

Determine immediately on arrival of the specimen to avoid error through evaporation of moisture.

Use a platinum or fused dish of constant weight which has been kept in a desiccator over sulfuric acid. Weigh the dish accurately and rapidly, then introduce 2½ cc. of the well-mixed specimen, and heat in a drying-oven not over 100° C. for two hours. Then place in the desiccator over sulfuric acid for twelve hours or longer, and weigh accurately and rapidly.

The difference between these weights represents the weight of total solids. To calculate the percentage, divide by 2½ times the specific gravity.

Add to the dish two or three drops of fuming nitric acid, and heat over a flame, keeping the dish two inches above the top of the flame, until the black color has become white. Heat in the direct flame until glowing, place at once in desiccator to cool for one or more hours, and weigh. Calculate the percentage of ash as of total solids.

Caution. Do not entirely close the cover of the desiccator until the dish has partly cooled, otherwise the sudden heating of the air will raise the cover or create too great a vacuum.

Note. This technique appears complicated, but with the proper instruments and solutions at hand requires but little practice to become proficient in its use, and it is not always necessary to carry out a complete analysis to obtain valuable information upon which to base a diagnosis and recommend local and constitutional treatment.

PRACTICAL EXPERIMENTS ON THE EFFECTS OF MASTICATION ON SALIVA.

A series of experiments with this technique were undertaken; first, to determine the enzymic value of a specimen of a given subject before and after functional stimulation by mastication, plus the stimulation caused by the sense of taste.

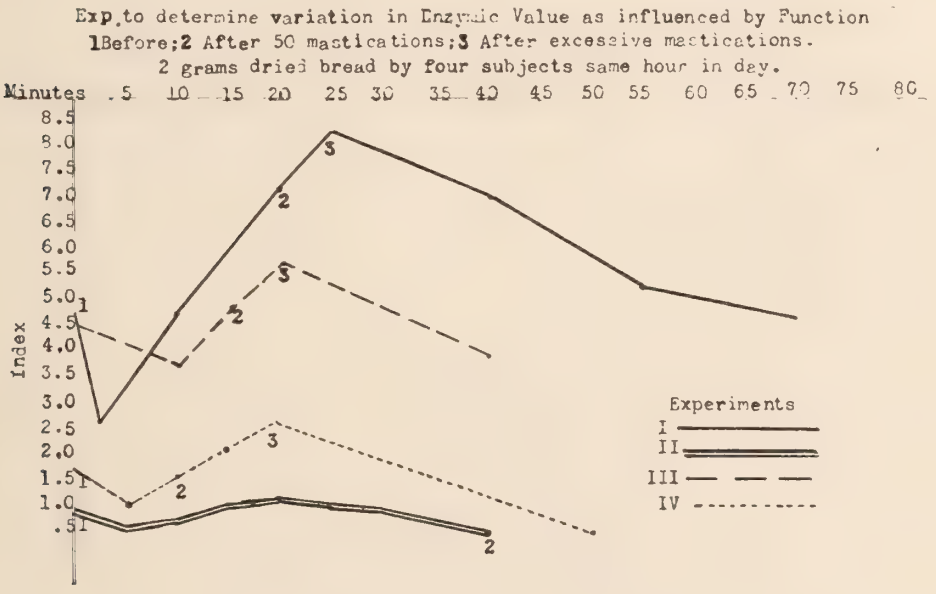
First series.

5 cc. of saliva was collected, and 2 drams of dried bread carefully weighed was given to the subject, who masticated fifty times and expectorated the bread, when the mouth was again rinsed with aqua destillata, and another 5 cc. of saliva was collected; again 2 drams of bread was given, which was masticated until fluid, when the mouth was washed with distilled water as before, and a third specimen of 5 cc. of saliva was collected, also three additional specimens every fifteen minutes.

Four experiments (see diagram No. I) were made at different times during the day; two upon subjects with normal occlusion, and two with missing molars. It will be noted in this illustration that all experiments paralleled. Nos. "I" and "III" in diagram I were from subjects with normal occlusion, and the changes in enzymic value will be observed; first the ferments seem to have been used up in the chemical combination, but in ten minutes the value rose and continued in its upward curve for ten minutes more, the second stimulation by mastication raised the value still higher, for from five to ten minutes, gradually dropping off until at the end of one hour it returned to its original strength.

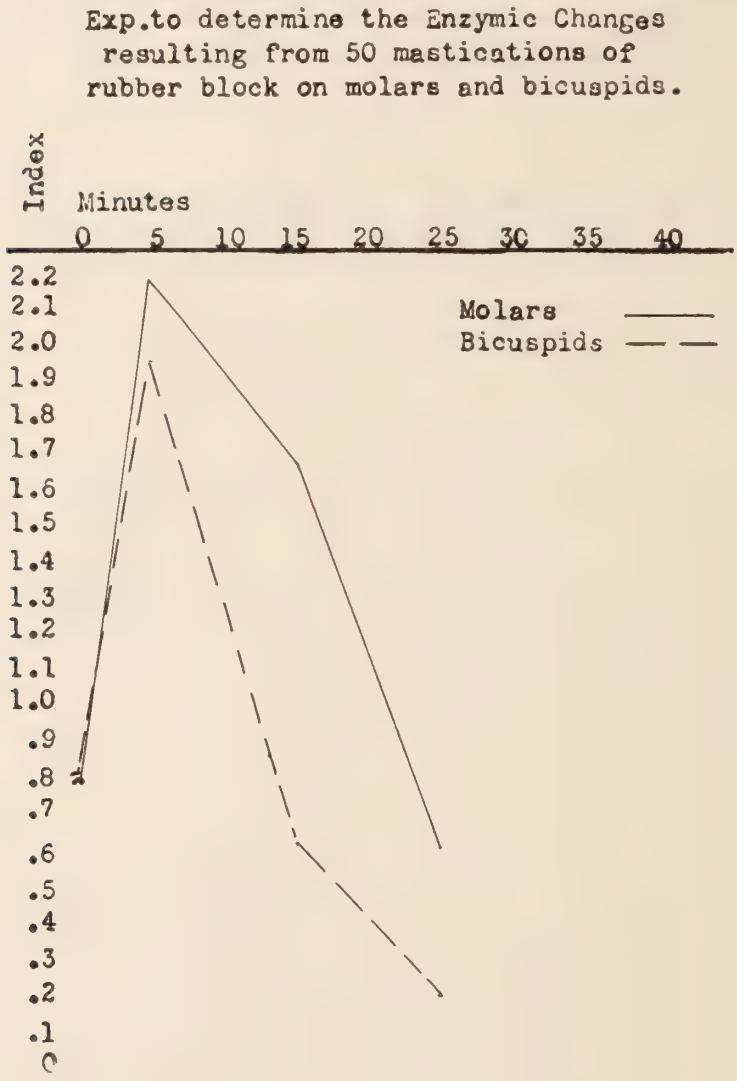
This series seemed to prove that the enzymic value of saliva was stimulated through function as well as the sense of

I.



taste. It is noteworthy because other physiological investigators have shown excessive mastication produces the greatest reduction of carbohydrates.

II.



that the flow of secretion from the involuntary organs, the stomach and pancreas, are marvelously controlled by the nervous system, throwing out a proper amount of ferment to digest the varying amount of foods, and it proves that the

Second series.

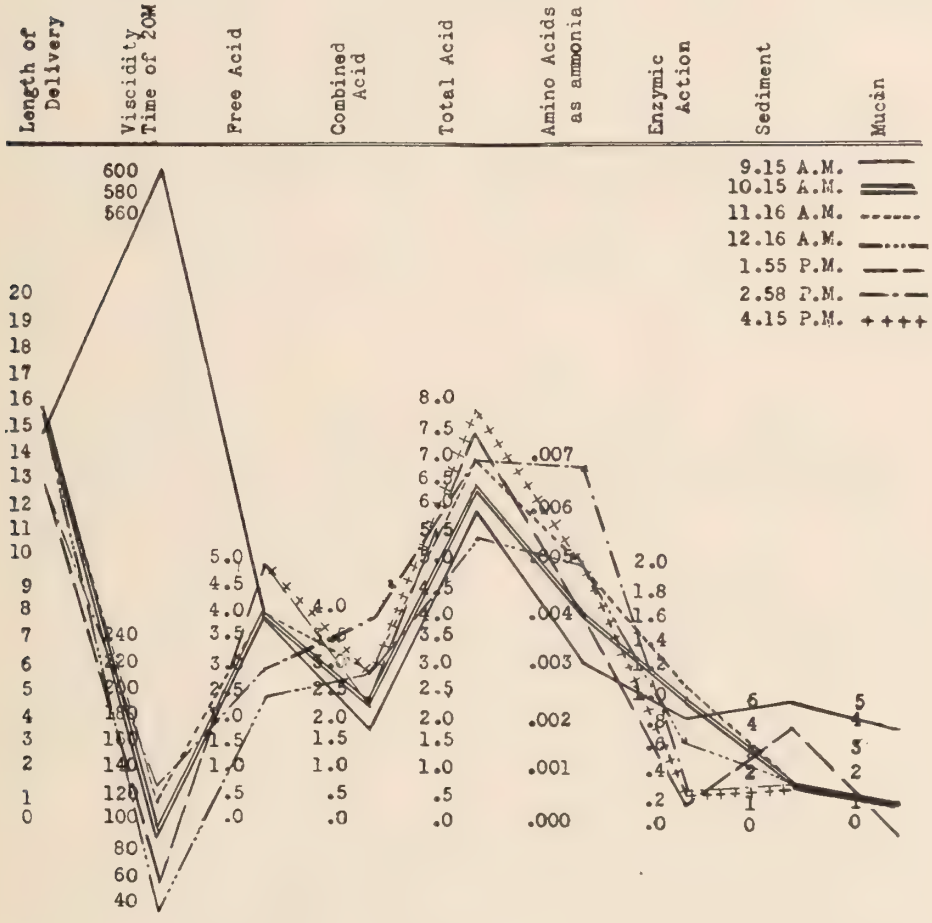
In order to check the foregoing as to the value of function, an experiment was made (see diagram No. II) using a young man of seventeen years of age with

normal occlusion. He masticated upon a rubber block fifty times; first upon the molars and then upon the bicuspids. In both cases the specimen was taken before, and at intervals of 5, 15, and 25 minutes after, and the curve will be noted.

This subject was the one used in the first experiment in diagram No. I. The enzymic value increased 1.5 index with fifty mastications of dried bread in the first experiment; in the second, with fifty mastications on the rubber block, the increase was 2.4 on the molars, the bicuspids showing a lesser amount of enzymic stimulation.

III.

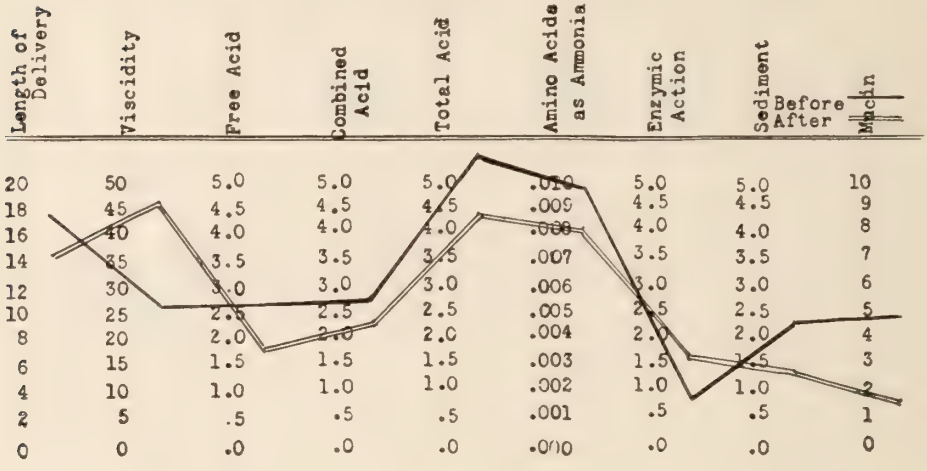
Physiological Variations in Saliva of a Subject during a Day.



A correction must be made as to the variation of the time of day, as the first experiment was made at 11.30 A.M., and the second at 1.30 P.M., both before the noon meal. But even with this correction the effect was sufficiently great to prove the premise.

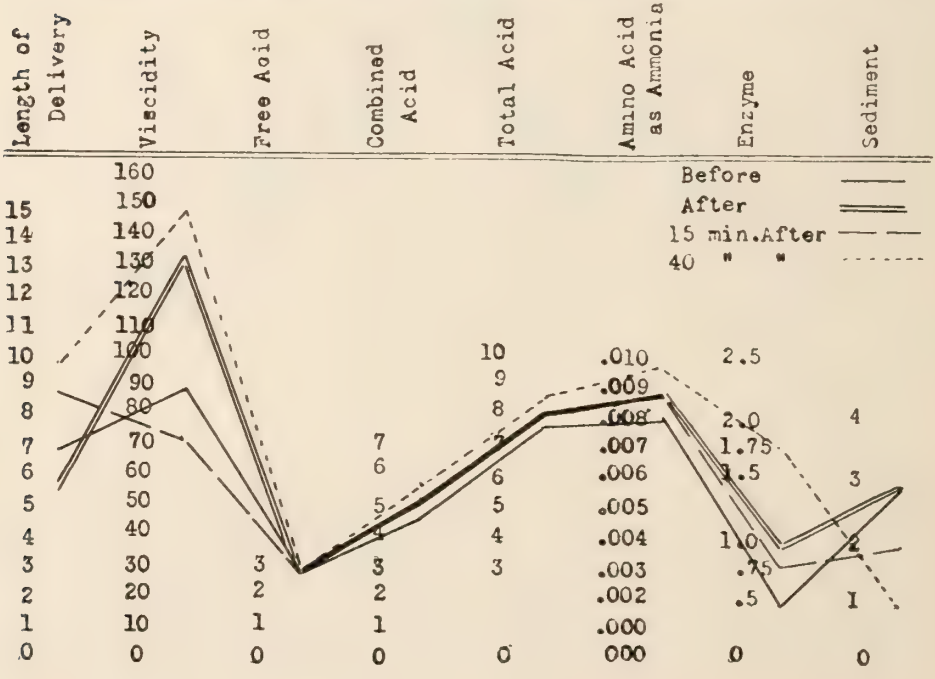
IV.

Changes through function of mastication without reflex action by the sense of taste. Pre-molar mastication of rubber block 50 times.



IVa.

Exp.through function of mastication without reflex action by the sense of taste.Molar mastication of rubber block 50 times.



Third series.

A third series of experiments (see diagram No. III) was undertaken to note the physiological changes in one subject during a given number of hours of the day. These specimens were delivered by a professionally trained assistant.

Seven specimens of 20 cc. were collected and analyzed at intervals of an hour, and the accompanying chart will show the variation in the length of time of delivery, the viscidity, free acids, combined acids, total acidity, enzymic action, centrifuged sediment, and mucin.

A number of experiments of this character were carried out on the same subject, the curves paralleling with few exceptions during the different days.

One lesson to be drawn from these findings is that the time of day is important, and a series of observations should be made on the same hour for the best comparison.

Other experiments.

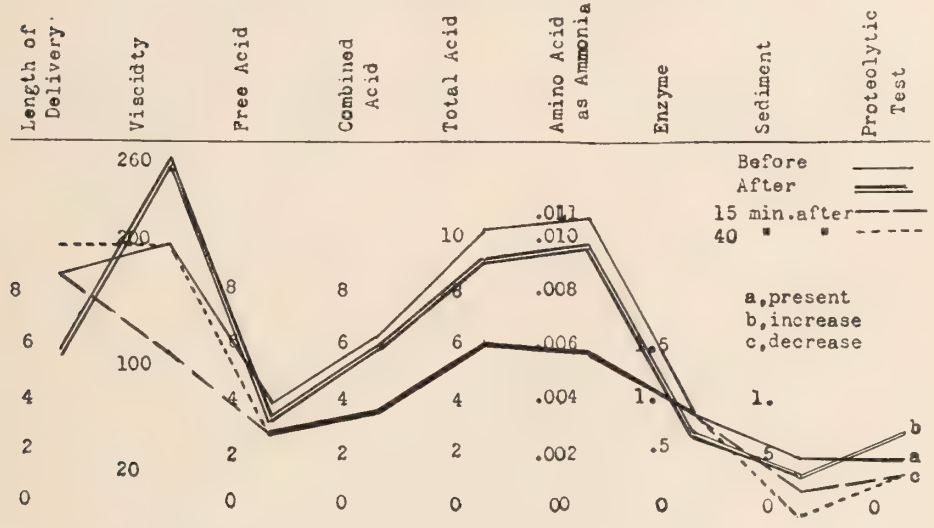
Experiment IV was made according to the preceding technique to show other changes taking place through the function of mastication, without the sense of taste, by masticating fifty times upon a rubber block, first upon the bicuspids and then upon the molars. In experiment IV*a* specimens were taken before, immediately after, and 15 and 40 minutes after action.

The first experiments upon the molars showed increase in viscidity, increase in enzymic strength, and decrease in centrifuged sediment and mucin. The sediment showed a greater change in these findings, and considerable fluctuation when taken 15 and 40 minutes later. The last finding seemed to be greatly increased in all its properties, with the exception of the mucin.

Experiment V was undertaken to show

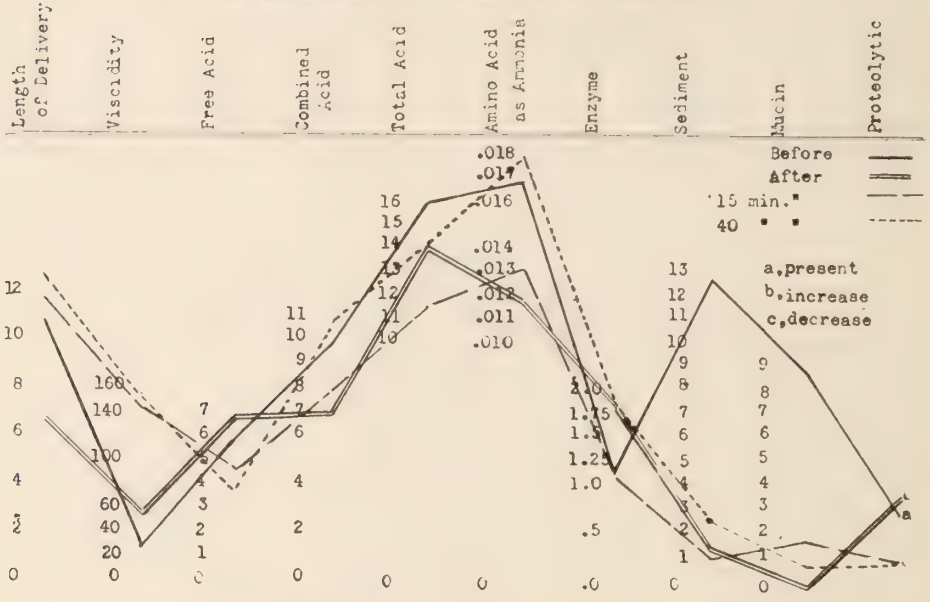
V.

Experiments to determine Physiological Changes Upon 50 mastications of 4.4 grams of meat not swallowed.



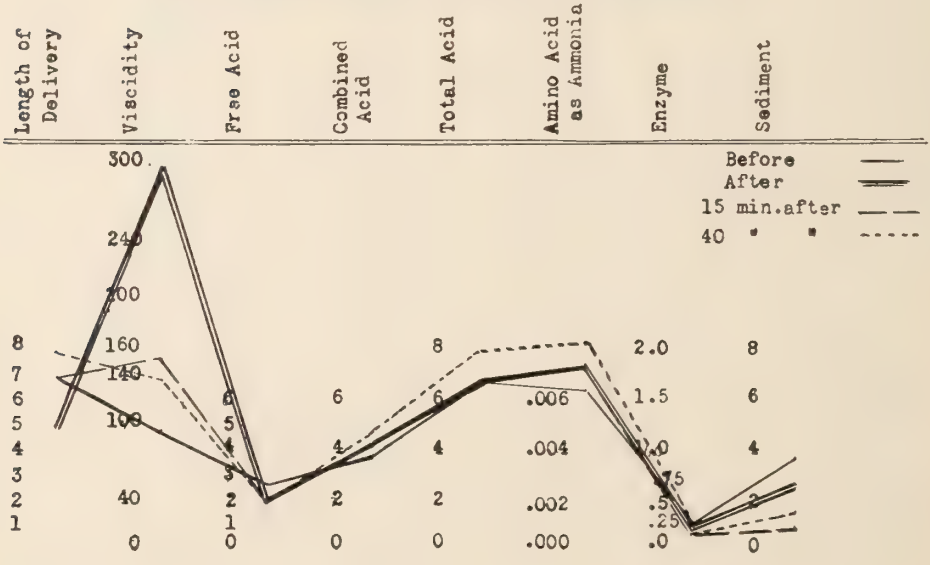
VI.

Experiments to determine Physiological Changes
50 mastications of 4,4 grams of meat, swallowed.



VII.

Experiments to determine Physiological Changes.
10 c c of milk held in mouth 1 minute, not swallowed.



physiological changes resultant from the mastication of meat.

Technique: 7 gm. of steak was carefully weighed and cooked, subsequently weighing 4 gm. and 4.29 mgm.; 8 cc. of saliva was collected, then the meal was chewed fifty times; 8 cc. was collected immediately after rinsing the mouth, and again 15 and 40 minutes later.

This plot will show the physiological changes. The flow was very much more rapid, becoming normal in 15 minutes. The viscidity increased immediately, then decreased in 15 minutes; it was the same in 40 minutes.

The acidity decreased as other findings. The enzyme showed little change, but the proteolytic ferment increased.

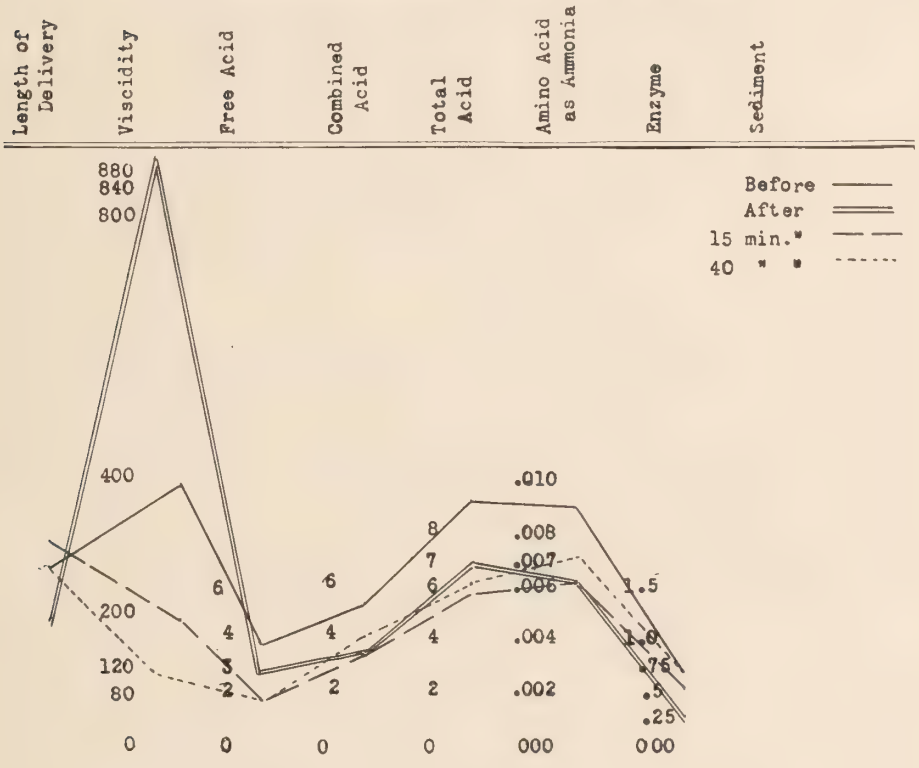
Experiment VI. In this instance the meat was swallowed, which involves a greater variation in all the properties, most particularly in centrifuged sediment and mucin. This was carried out upon a subject with a normal occlusion.

Experiment VII. This experiment was made to determine the physiological changes of 10 cc. of milk held in the mouth one minute, and expectorated.

Experiment VIII. This test was made to determine the physiological changes of 10 cc. of milk held in the mouth one minute, and swallowed.

VIII.

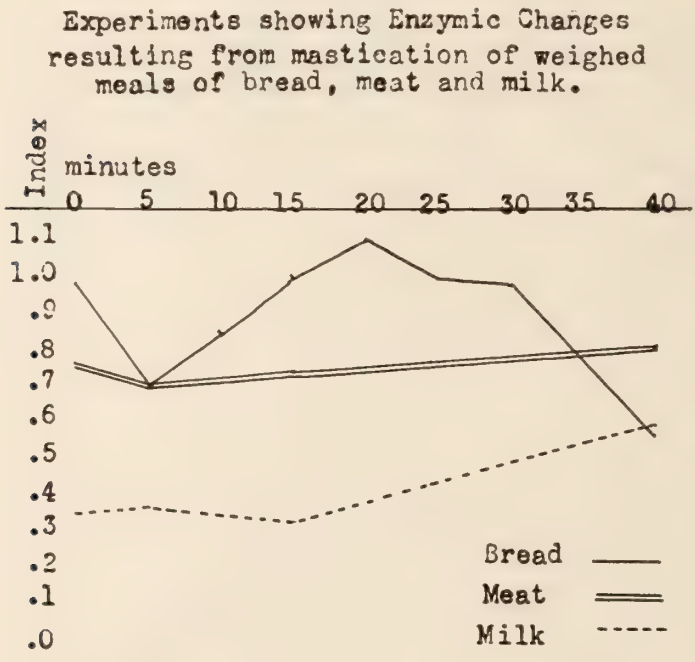
Experiments to determine Phsyiological Changes.
10 c c Milk held in mouth 1 minute and swallowed.



In these experiments we note that the viscidity is greatly increased, and the sediment decreased; but where the specimen was swallowed, a decided decrease is seen in all other findings.

Experiment IX was undertaken to show enzymic changes resulting from mastication of a weighed meal of bread, meat, and milk; eight specimens were taken at intervals of 5 minutes. The experiments were made in one subject, an hour elapsing between each meal.

IX.



EXPERIMENTS SHOWING THE EFFECTS OF SODIUM THIOCYANATE ON SALIVA.

Experiment X. A series of experiments was then instituted to show the effects of 1 grain of sodium thiocyanate taken internally. Specimens were taken before, and 36 and 80 minutes after.

The subject was conscious of a slightly stimulating effect, and showed an increased blood pressure. There was a decrease in the enzyme, but the last specimen was taken an hour after a noon meal.

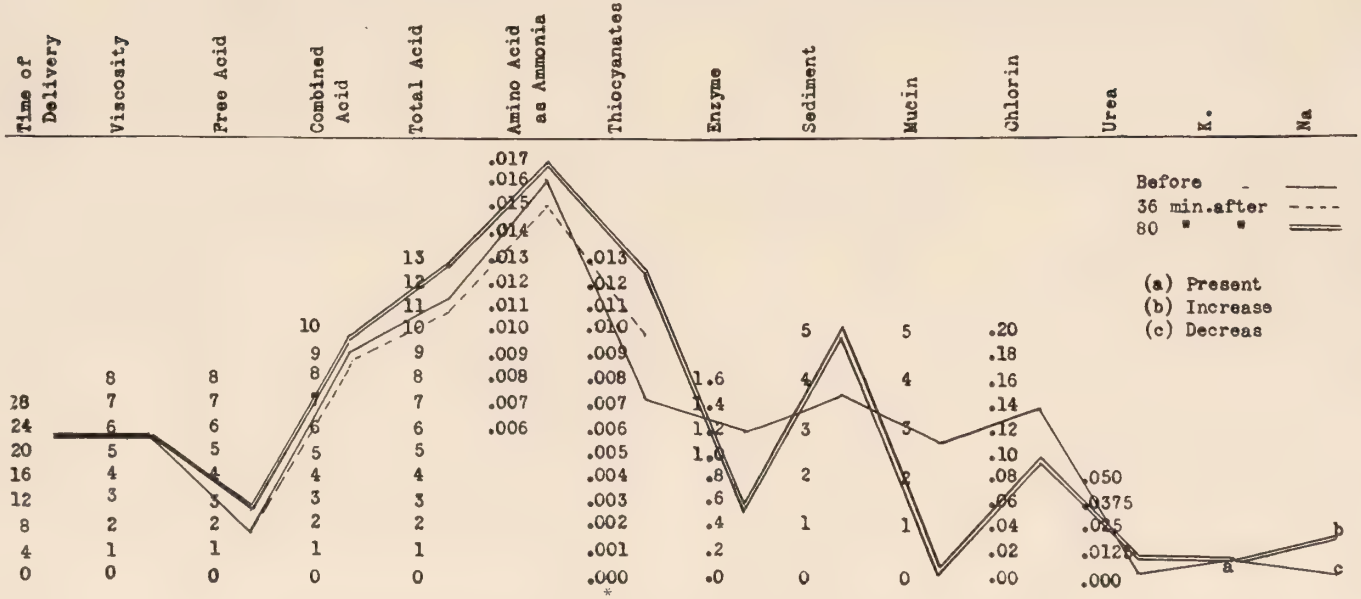
One of the most noteworthy findings of this plot, which has been verified by a number of other findings, is the decrease in the amount of mucin; but the increase in the centrifuged sediment was found to be true in the examination of ten other specimens, as this drug has a physiological effect in reducing sediment of all kinds in the saliva as well as the urine.

EXPERIMENTS SHOWING EFFECTS OF DENTIFRICES ON SALIVA.

A series of experiments was instituted to determine the physiological changes in one subject's saliva as influenced by basic chemicals which are introduced into our mouth-washes and dentifrices.

X.

Experiment to show effect on saliva of 1 grain of Sodium Thiocyanate taken internally.

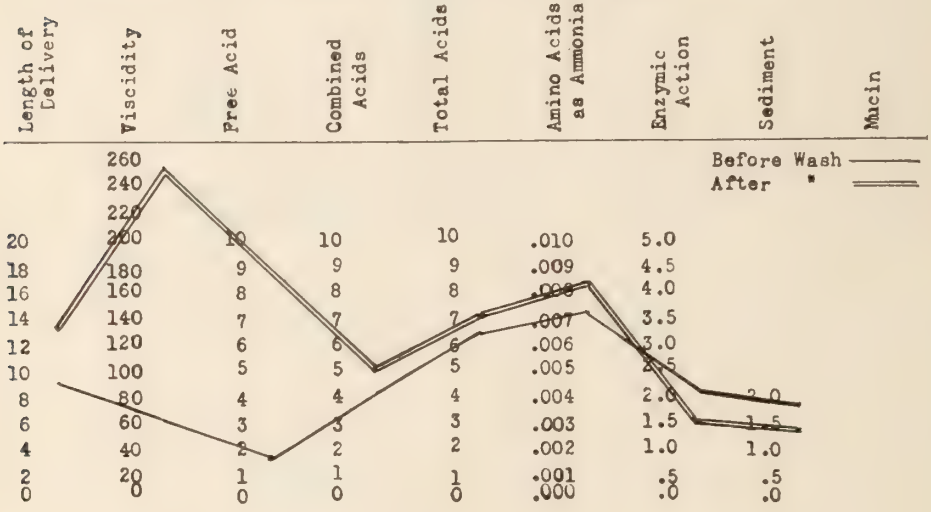


* The thiocyanate readings should be inverted, .007 appearing in place of .013.

Experiment XI showed physiological changes from 12 cc. of a 10 per cent. formalin solution in 2 oz. of aqua destillata, held in the mouth for one minute.

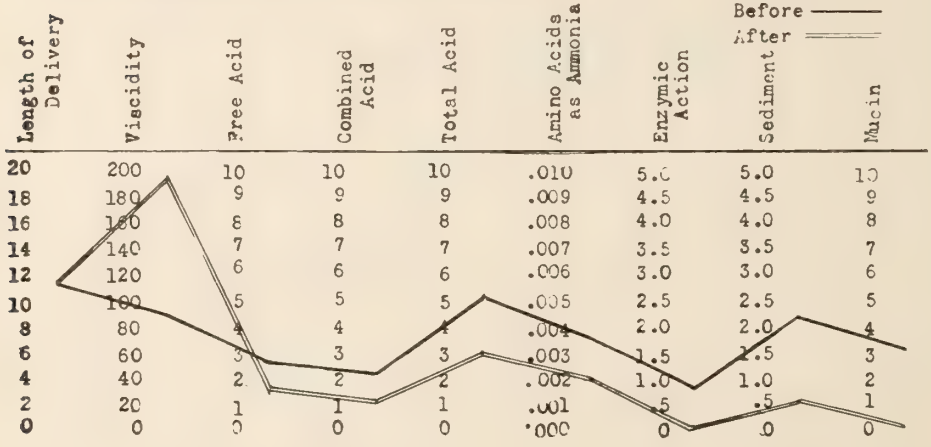
XI.

Experiments with Alcohol to determine Physiological Changes.
12 c c of 10% sol. held in mouth 1 minute.



XII.

Formalin Experiment: 13 .5% sol.to 23 aq.dist.held in mouth 1 minute.



solution of alcohol, held in the mouth for one minute.

Experiment XII showed physiological changes from 1 dram of a 0.5 per cent.

Experiment XIII: Menthol in saturated aqueous solution (0.5 per cent.), 12 cc., held in the mouth for one minute.

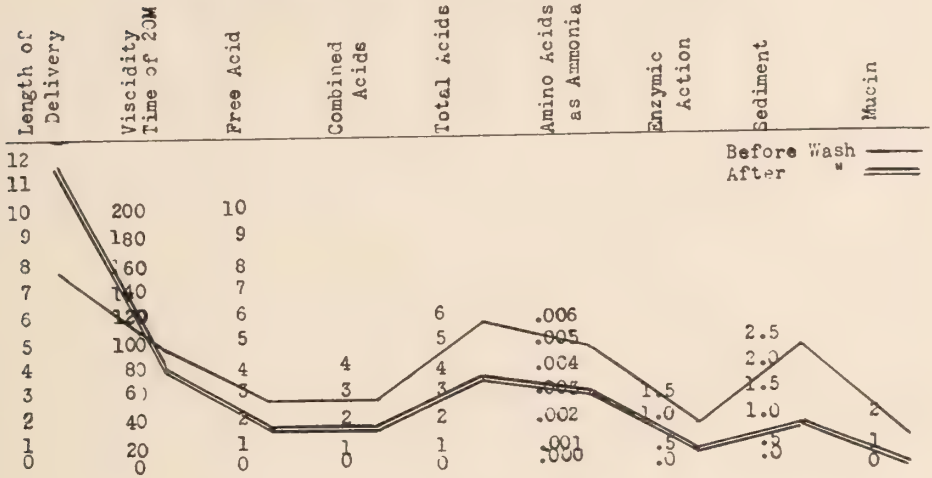
Experiment XIV: Glycerin 1 part to

9 parts H_2O, 12 cc., held in the mouth for one minute.

Experiments XVI and XVI*a*: Saccharin, 10 cc. of a 1 per cent., and of

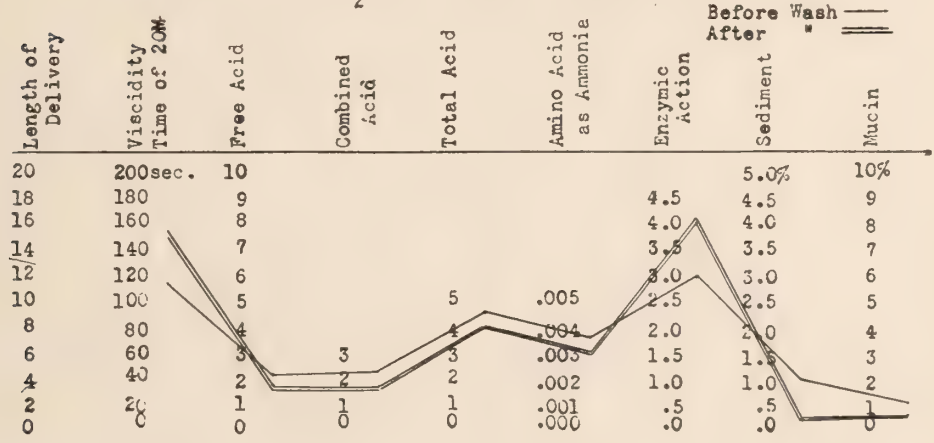
XIII.

Experiments with Menthol to determine Physiological Changes.
Sat. H_2O Sol (.5%) 12 c c held in mouth 1 minute.



XIV.

Experiments with Glycerine to determine Physiological Changes,
1 part to 9 parts H_2O - 12 c c held in mouth 1 minute.



Experiment XV: Starch, 12 cc. of a 2 per cent. solution, held in the mouth for one minute.

a 10 per cent. solution, each held in the mouth for one minute.

The second solution, of 10 per cent.,

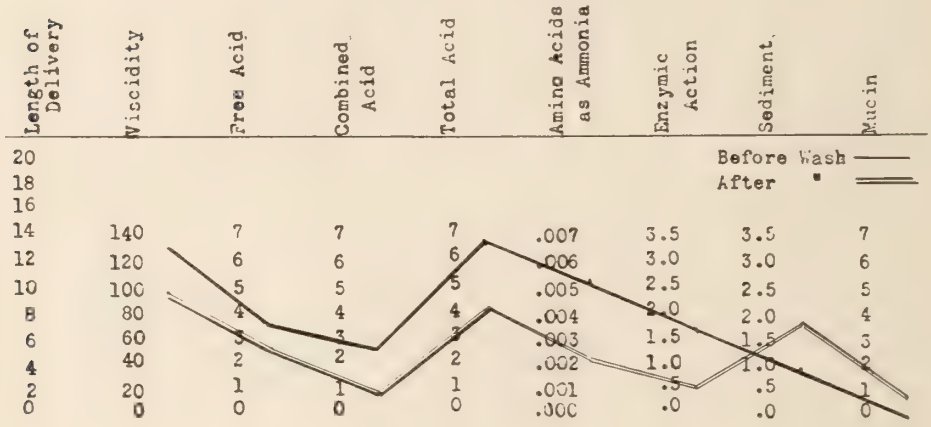
would seem to prove the accuracy of the curve, as the action was increased or decreased to a proportionally greater extent.

CONCLUSIONS.

In drawing a conclusion from these findings, it must be understood that the

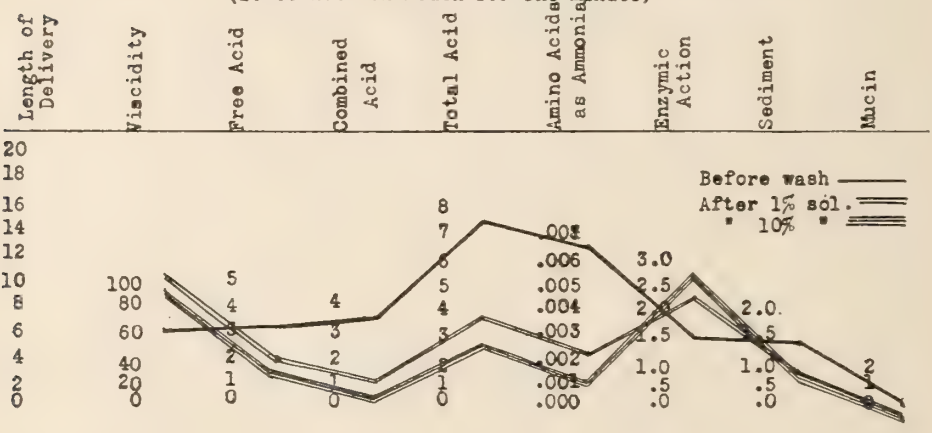
XV.

Experiments with Starch to determine Physiological Changes.
12 c c of 2% Sol. held in mouth 1 minute.



XVI. XVIa.

Experiments with Saccharine to determine Physiological Changes.
(10 cc held in mouth for one minute)



Information gathered by careful study of the last series may be used in the writing of prescriptions, to attain a modification in the salivary secretion as far as the local treatment is concerned.

numerals are of value only in considering the particular experiment, a duplication of which, upon the same subject at different times of the day and on different days, would show different numerals, but the

changes would parallel. It is found by our experiments that different subjects show parallel variation of gross changes in the aggregate.

A reduction will be noted in almost all the acid properties with these chemicals; this we attribute to the stimulation of the alkaline and mucoid secretions.

Your committee, after this investigation, feel that while this work is in no way complete, and is but a start in a physiological investigation, they are now better able to enter the pathological field for information that we all are seeking.

We recognize that the work done by Dr. Russell W. Bunting upon the thiocyanates shows the necessity of a correction in our findings according to the technique upon examination for diacetic acid, but the technique recommended by him does not prove to be so practical or so delicate as the one adopted.

Dr. Percy R. Howe's elaboration upon the technique for the determination of the acid index has improved our information, and we have adopted part of his recommendation, which has given us more accurate findings.

We wish to acknowledge the invaluable interest displayed in this work by our assistant, Miss Ruth S. Finch, A.M., who has executed the technique in these reports, and personally supplied a great deal of material for experiments.

We can further report that a number of colleges with thoroughly equipped laboratories and biologically trained assistants are writing for information and are interested in carrying the work forward, and it would seem that the information gained by this research would be of sufficient practical value for this society to supply funds sufficient to defray the expense for further investigation.

Respectfully submitted,

HENRY C. FERRIS, *Chairman.*

Discussion.

Dr. E. E. HAVERSTICK, St. Louis, Mo. I wish to congratulate Dr. Ferris and the committee on the work accomplished. This work has seemed to me for many years one of the most important that the dental profession has been engaged in. There is nothing that influences caries or the lack thereof as much as the conditions of the saliva, and I hope that this association will see fit to give the committee sufficient funds to carry on this work.

Dr. F. W. Low, Buffalo, N. Y. I had the pleasure of having a conversation with Dr. Burnheim this morning, during which he stated that the dental surgeons of the United States army are going to do some valuable work for us, and that assistance has been promised them from Washington. I think they will be better able to do this work than the average dentist, because they have more leisure. You know that we who are active practitioners have to sit up until three and four o'clock in the morning if we undertake to do this work.

I want to congratulate the essayist, to thank him for valuable suggestions he has given me, and to say a word further because of some of the comments that I have heard since the reading of my paper. Many of the members have asked if they could make these tests so that they would be of any value to them in regard to the potassium sulfocyanate provings. A very delicate test is required, and one which the average practitioner would not care to make, in order to be certain

of the absolute correctness of one's conclusions regarding the presence of potassium sulfocyanate in the saliva. Yet the crude perchlorid of iron test answers very well, for the reason that it is only such cases as are deficient that we are called upon to medicate, and their deficiency is as well proved by the crude as by the more intricate test. Personally, I believe that stomachic medication is called for whenever a salivary test discloses a natural deficiency.

SECTION I:

Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

Chairman—Stanley L. Rich, Nashville, Tenn.
Vice-chairman—B. Frank Gray, Los Angeles, Cal.
Secretary—Harry E. Kelsey, Baltimore, Md.

TUESDAY—July 25th.

Section I was called to order at 8.30 P.M. on Tuesday, July 25th, by the chairman, Dr. Stanley L. Rich, Nashville, Tenn.

The first order of business was the reading of a paper by Dr. F. B. Noyes, Chicago, Ill., entitled "A Review of the Development of Orthodontia," as follows:

A Review of the Development of Orthodontia.

By FREDERICK B. NOYES, D.D.S., Chicago, Ill.

It is not my purpose to present in this paper a history of orthodontia, nor even to trace the factors that have been introduced into it by different men. It is evident to anyone who will compare either the practice or the literature of this subject at the present time with that of twenty-five years ago, that orthodontia is not today what it was then.

THE GROWTH OF THE SCIENCE OF ORTHODONTIA.

It is my purpose to examine critically the factors which have led to this development. In this I do not intend to study the development of regulating appliances, except in so far as they inaugurate new ideas or have led to the development of

new thoughts, and I am less interested in the origin of the idea, or the particular man to whom it should be credited as original—desirable as that may be—than in the effect which these ideas have had upon development. It has probably been true in orthodontia, as in every other subject, that a partially worked-out idea has been completed by another, or that a complete idea has been applied, so as to become useful and effective, by one who obtained the idea from an earlier inspiration. Every thought, practical or otherwise, may have its ancestry traced, but we are not so much concerned with tracing them backward as forward. It is evident, from the standpoint of the best service possible, that the consideration of an orthodontia case involves the consideration of many factors and the careful weighing of many ideas that would not have entered into the problem at all in the mind of an orthodontist twenty-five years ago. It would be interesting to compare the mental processes of a man studying an orthodontia case from the standpoint of the present day with those of a man of a generation ago, and such comparison would be profitable to the dental profession in general, for there are very many practitioners who do not appreciate that the modern orthodontist has to consider many factors that previously were not recognized as a part of the problem.

PERSONAL FACTORS.

It has seemed to me that some factors which might be considered as very unimportant have had a great influence upon the course which the development of orthodontia has taken. There have been factors of personal antagonism and animosity, to which I shall not refer, but which have been very unfortunate. Nothing can stimulate the development of a subject more than active and animated or even partisan discussion, but the injection of personal feeling or animosity has never any place in a scientific discussion, in which all parties are supposed, at least, to be interested only in arriving at the truth. For a long time it has seemed to me that the apparent determination of certain factions not to understand each other or weigh facts without personal bias was an incubus which orthodontia needed to shake off.

THE REQUIREMENTS OF AN ORTHODONTIST.

As is true in every science and art, the development of orthodontia has been greatly affected by the developments of biology and the other sciences, including mechanics, during the last half-century, and by the growing appreciation of the principles of art. Finally, in considering this subject it should always be borne in mind that orthodontia is both a science and an art, requiring knowledge and skill for its practice. As in sculpture, anyone possessing an appreciation of size, proportion, and harmony of lines may acquire the skill to reproduce a face or figure in clay or marble, so in orthodontia anyone possessing the knowledge that enables him to see through the tissues and interpret their biological response to environment, may acquire the skill to produce almost unlimited tooth movement. But if he is to render useful service, he must also have the keenest artistic perception and the finest appreciation of harmony, proportion, and balance of line and mass.

If one has a conception of nature's mechanism of development so as to be able to recognize any defects that may lead to an error in growth, and a grasp

of the relation of type in tooth form and arrangement to the architectural plan of the skull and the entire individual represented in the individual type, he may be able to acquire the skill that will enable him to replace by artificial forces the defect of nature in the mechanism of growth. But without this appreciation of natural laws, no amount of skill will enable an orthodontist to obtain good results except by accident. Skill must be used with knowledge, but the highest grade of skill is required for the application of such knowledge. The changes in orthodontia have been marked by a growth of knowledge and of skill in the application thereof.

THE ATTITUDE OF THE EARLY PRACTITIONERS OF ORTHODONTIA.

The disfigurement of appearance due to crooked and irregular teeth apparently first caused people to apply to the dentist for an improvement of conditions. It was to the dentist that they naturally turned for service in any condition that involved the teeth, for he was of course expected to know more about them than anyone else, and there was usually the impression that there were too many teeth, and that some should be extracted.

The dentist's mechanical skill and the observed fact that, by applying force, teeth could be moved and made to take new positions induced him to undertake the improvement of personal appearance in these cases. Apparently the only aim sought originally was the obtaining of an even row of teeth, and so in all of the earlier writings on orthodontia, teeth are spoken of as being out of alignment, and the only object desired was the restoration to perfect alignment. At this stage the dentist's interest lay in the production of mechanical devices which would cause the movement of the teeth desired, and the problem was always considered primarily from the mechanical standpoint, the esthetic considerations being limited to obtaining a row of even teeth. Only the anterior teeth, of course, were thought of, as they were the only ones that could be seen, and usually consideration was limited to the upper incisors and canines. In all of these writings the regulating of teeth is always spoken of as the teeth being forced into place, being pushed or pulled into line. This movement is always thought of as going on in two dimensions of space, and as being accomplished by the mechanical device which forces the tooth through the tissue.

In this period the operator was interested in the manufacture of an appliance by which the teeth could be moved, and one needs only to read the titles of articles on orthodontia in the dental journals to see how persistent this attitude has been.

Up to this time there had been development in orthodontia, but it was chaotic, and the greatest confusion prevailed. The causes of malocclusion were disregarded or assigned to degeneracy, and were in no way related to treatment, it being said that the operator was not concerned with how the teeth had become irregular, but how they could be straightened. Teeth were moved without any regard to where they were intended to be, and consequently they very seldom stayed where they were placed, and every case resulted in the description of a new appliance. Esthetic considerations were a matter of individual taste on the part of the operator, and were based on his ideas of beauty and of the features as developed. The time advised for treatment was after all the teeth—except the

third molars—had erupted, and the idea was that the teeth could be moved so as to harmonize the abnormally developed features.

ANGLE'S NOVEL SUGGESTIONS.

I believe it was Farrar who first suggested, in the *Dental Cosmos,* that the time might come when appliances for moving teeth would be manufactured and sold ready for use, and be adapted to the individual cases by the operator. Following this idea, and as a result of his study of the literature and of his own experience, Dr. Angle came to the conclusion, at about 1887, that the only forces which could be applied to teeth were pushing, pulling, or twisting movements, and that the simplest form of appliances capable of exerting force in these three directions was needed; further, that these appliances should become the instruments by means of which force should be applied, and that the orthodontist should devote himself to obtaining skill in their application and knowledge for the solution of the problems presented. This, in my opinion, marks the first step in the evolution of orthodontia as a science, for it changed the focus of attention from the devising of appliances to the acquirement of skill in their use, and of knowledge as to what was to be accomplished by them.

Unfortunately, this met with organized opposition. The argument was at once put forward, "Why should you buy appliances that you can easily make for yourself?" and as the dental profession was already interested chiefly in the making of mechanical devices rather than in the study of the biological problem, this was an appealing argument. The result was that in all dental schools the attention of students was concentrated upon the production of mechanical devices rather than upon the study of principles. As is well known, few men develop very greatly after leaving the professional schools, and consequently, when practitioners failed in the treatment of cases, they blamed the mechanical device rather than the violation of an underlying principle.

THE SCIENCE OF OCCLUSION.

In Dr. Angle's mind, however, equipped as it was with inventive instinct, mechanical genius, and a picturing imagination, the knowledge that his mechanical principles were correct forced him to look farther for the explanation of failures in practice. The study of his cases by means of accurate models which reproduced not only the occlusal surfaces and general positions of the teeth, but every detail of structure as far as the muscles could be forced away, developed in his mind a conception of the mechanism of occlusion and its important bearing upon the development of the bones of the face. To him occlusion came to mean more than the relation of the teeth when the jaws were closed or a device for the mastication of food. He recognized it rather as a complicated mechanism which was put to action by a number of functions, including mastication, respiration, deglutition, and other muscular actions, which result in the development of the bones of the face. This mechanism owed its efficiency to the interlocking of a great number of inclined planes which react upon each other.

From the study of his models he saw how the working of the mechanism in its normal way led to normal development, while a deviation from the normal relation of the inclined planes would result in a progressive deformity.

The discovery of the science of occlusion marks the beginning of the development of orthodontia, but this discovery was the result of the mastery of mechanical principles and the search for the cause of failures in other directions than in the failure of appliances.

THE ANGLE CLASSIFICATION.

The discovery that occlusion and the relation of the inclined planes in occlusion was the mechanism by which all of the forces which lead to development are distributed rendered possible the discovery of the classification and diagnosis of malocclusion. The Angle classification is far more than an arbitrary arrangement of cases by the occlusal relation of the first molars, for the malrelations of the first molars in the various classes and divisions lead to and are necessarily accompanied by abnormal action of the developmental forces which are characteristic of the class and division. This is the great merit of Angle's classification, and those who do not recognize it have not yet begun to understand the classification. The working out of this classification gave the first scientific basis to orthodontia and systematized its progress, for it established a system not based upon any form of appliances or manner of constructing them, but upon nature's mechanism involved in the development of the face. As the discovery of the mechanism in cross-fertilization has become the basis of the enormous development in horticulture, agriculture, and stock-breeding, and has rendered possible the startling results of such men as Burbank, so the study of the science of occlusion has made possible the development of orthodontia.

TIME OF TREATMENT.

One of the most important results of the study of these laws has been the revolutionary change in the time of treatment. Not many years ago the universal opinion was to wait until all the teeth had erupted, when they could be moved into such positions as to harmonize with the features as developed, or to produce a harmony of the features. Now it is recognized that as soon as a perversion of the mechanism which leads to the development of the features becomes established, it should be corrected, in order to allow nature to develop the face in its intended type. The teeth, formed as they are in their perfect character before they come under the influence of environment, are a most perfect expression of the individual type, and are designed to mold the type through function, which is also an expression of type.

TYPAL CONSIDERATIONS.

A disturbance of the relations of the inclined planes of the teeth perverts the normal action of the mechanism of occlusion, and must result in a distortion in the development of the intended type of the individual.

The idea, therefore, of orthodontic procedure is to correct, by means of artificial forces, the perversion of the mechanism of development, and then allow nature to form the features that were designed for the individual type in perfect harmony and balance. This is nothing short of an inversion of the older ideas.

MAINTENANCE OF MASTICATORY FUNCTION DURING ORTHODONTIC TREATMENT.

It should be emphasized that the placing of the teeth in normal cusp relations is not a solution of the problem. After normal cusp relations have been established, the occlusion must be used in normal function, else development

will not go on normally, and the intended type will not be realized. It is useless to establish normal occlusion and place the mechanism in proper working order unless it is used in mastication, respiration, and muscular activity to distribute the mechanical stimuli which lead to bone growth. Many operators have lost sight of this, and have allowed or forced patients to acquire habits of imperfect mastication during treatment that have been the cause of failure of retention, or have led to the development of a new deformity. To obtain results the teeth must be used in mastication during treatment, and as a general rule the more vigorously they are used the more rapid and successful will be the treatment. Few have realized that they were using the force exerted by the teeth in mastication to assist in the movement, and that the amount of this force often determines the amount of artificial force that can be used.

THE LINE OF OCCLUSION.

To my mind the conception of the "line of occlusion" is the greatest generalization that has come into orthodontia, and it is to be contrasted with the old idea of alignment of the teeth, from which it has been evolved. The line of occlusion is defined as—"The line with which in form and position, according to type, the teeth must be in harmony, if in normal occlusion;" but this definition means very little to one who has not thought deeply upon the subject.

The line cannot be drawn on paper, for it occupies three dimensions in space. It must be conceived of as being related to the architectural plan of the skull and the entire individual type, and the occlusal contact of the teeth and every inclined plane is related to it.

It is a wonderful conception that the teeth as developed in their bony crypts, with their peculiar formation of crown and cusps, are an expression of the individual type, and that if all the forces in the mechanism of development act normally, they will occupy a predetermined position which is also an expression or a perfect working-out of the type. The achievement of the line represents the ideal of physical development in the individual. Every individual's line of occlusion is peculiar to him, and no two are exactly alike any more than any two faces are exactly alike, or one leaf of a tree is an exact duplicate of another. The line of greatest occlusal contact approaches the line of occlusion in any individual in proportion as the individual approaches the normal in the development of his type.

A general conception of the line of occlusion can only be obtained by the study of the occlusal relations of the teeth to the skull and the entire individual in a large number of perfectly developed types, and the ability to conceive and mentally picture this line in individual cases measures a man's real ability in orthodontia.

BAKER'S INTERMAXILLARY ANCHORAGE FOR CORRECTION OF MESIO-DISTAL RELATION OF MOLARS.

The application by Dr. Baker of intermaxillary anchorage for the correction of the mesio-distal relation of the molars was a most important factor in the development of this field. It made it possible, with simple and easily worn appliances, to establish the normal cusp relation of molars and bicuspids, thereby restoring the mechanism of occlusion to its normal action in the distribution of the developmental forces.

By means of this method of applying force, movements that had never before been undertaken, and which were even denounced as impossible or injurious by very prominent men, were easily accomplished.

The molars had been considered as a sort of immovable rocks which might serve as anchors in moving about the other teeth. Intermaxillary anchorage proved that it was just as possible to move a molar distally as it is to move an incisor labially, and that by obtaining normal cusp relation of the molar, the other teeth could be brought into normal relation, and in no other way.

The discovery of intermaxillary anchorage was important as a factor in development because, following the discovery of classification, it rendered possible to apply in treatment the principles which were fundamental in the classification.

ABNORMAL RESPIRATION AS RELATED TO ORTHODONTIA.

The recognition of the forces which, being distributed through the mechanism of occlusion, are instrumental in producing growth, stimulated the study of the perversion of these forces as causing malocclusion. In this connection the first factors to attract attention were the effects of abnormal respiration. These at once brought the orthodontist into closer relationship to the rhinologist, and these two specialties mutually became necessary supplements. Although the teeth are placed in normal cusp relation, normal development cannot be expected without normal respiration; therefore, though normal occlusion be established, the air-passages must be clear, to obtain normal function in growth, and the rhinologist must supplement the orthodontist. On the other hand, if the teeth, especially the first molars, have locked in abnormal cusp relation, normal breathing is impossible, though the air-passages may be clear, because the malocclusion renders normal lip function impossible. The air-passages are not properly ventilated, and the pathologic conditions in the nose and air-spaces recur, and the orthodontist must supplement the work of the rhinologist. The interdependence and the appreciation of the rhinologist and orthodontist have been strong factors in progress.

THE PERIOSTEUM AND PERICEMENTUM IN RELATION TO TOOTH MOVEMENT.

In 1887 Dr. Black published a little book entitled "The Periosteum and Peridental Membrane." This book was practically lost sight of, and had little influence either on the medical or the dental profession until the orthodontists began to study the bone and peridental membrane in relation to tooth movement. Only one thousand copies were printed, and these were collecting dust in out-of-the-way bookshops until the orthodontists began to ask for them. Now the edition has been entirely exhausted, and the book is very difficult to obtain. In this book Dr. Black for the first time called attention to the movements of the teeth in three dimensions of space during the development of the face from the child to the adult. That in normal development the teeth were moving under the influence of physiologic forces which in no essential way differed from the artificial forces used to produce tooth movement, was a new thought. Few men have even as yet clearly or adequately conceived of the physiologic movements of the teeth.

Recognizing these movements, however, artificial forces were used to modify the direction of growth toward the normal instead of away from it, until the normal action of the mechanism of occlusion was restored.

PAIN UNNECESSARY IN ORTHODONTIC TREATMENT.

Orthodontic movements must be conceived, therefore, as occurring in three dimensions of space, not in two. As the physiologic movements occur without pain, it is evident that orthodontic movements, if properly conducted at the proper time and by the proper application of force, can be accomplished without pain. Pain in the course of treatment reflects only the ignorance and lack of judgment and skill on the part of the operator, and is not a necessary adjunct in orthodontic treatment. In fact, if the best results are to be obtained, force must be applied in such a way that the teeth will never be allowed to become sore enough to interfere with perfect mastication.

WIRE LIGATURES.

It would be a great mistake to fail to mention the use of the wire ligature among the factors leading to development. Up to the present time, the wire ligature has done more than any other one appliance toward securing perfect control of the forces applied, and in supporting the teeth during movement. It has been evident from the study of the tissues that, in order to obtain bone growth, force must always be exerted in the same direction; in this way the tissue changes are kept within the physiological range, but as soon as the tooth is allowed to move backward and forward, pathologic conditions are invited.

BONE-GROWING UNDER ORTHODONTIC STIMULUS.

The study of the structure and development of bone has led to the recognition of the fact that bone is formed in response to mechanical stimuli. It has been recognized that both in the evolution of the species and the development of the individual, the bones have been molded by all the mechanical conditions to which they were subjected. This has led to a change in the way in which all regulating appliances are regarded which is very fundamental. Instead of being considered as mechanical devices for moving teeth, they must be regarded as means of applying mechanical stimuli to the cells of the tissue. It is by bone growth that the teeth should be moved. The millions of cells in the substance of the bone are doing the work under the direction of the orthodontist, in response to mechanical stimuli.

OPPENHEIM'S EXPERIMENTS IN MONKEYS.

A very important forward step has just been taken in this direction by the researches of Dr. Oppenheim of Vienna, as will be shown in the results of his work on the tissue changes produced by the movements of the teeth of monkeys. This work gives us for the first time exact information in regard to the tissue changes which occur under the influence of mechanical stimuli produced by artificial forces.

THE FUTURE DEVELOPMENT OF ORTHODONTIA.

Finally, it is the practice of orthodontia as a specialty which has more than anything else led to its wonderful development. A large number of men have devoted their entire time and thought to

this specialty, and the result has been the acquirement of knowledge and the development of skill. The rapidity with which this department may develop in the future will depend, I believe, largely on the attitude which the dental profession in general takes in regard thereto. Orthodontia will develop, whatever the attitude of dentistry may be, but dentistry may help or hinder. If dentists recognize that orthodontia requires a basis of knowledge and skill which is separate from that required for the practice of other branches of dentistry, that it demands considerations not otherwise entering into dental problems, and for its successful practice necessitates special training, the development will be rapid, and the best result will be obtained for orthodontia, dentistry, and the public.

Discussion.

Dr. F. M. Castro, Cleveland. I have listened to the reading of Dr. Noyes' paper with very much pleasure. He has very fittingly described the factors which have worked toward the advancement of orthodontia.

I had expected to receive a copy of the paper some time ago, but it did not reach me until within the last few hours, and I have not had time to read it, to say nothing of carefully thinking over its subject. I will say, however, that I am in accord with most of the points which Dr. Noyes has presented. His paper, of course, is addressed more especially to general practitioners than to orthodontists, who are more or less familiar with this subject. There are other factors in the development of orthodontia than those mentioned, one of the most important being the present recognition of the necessity for this work, and of the results of the basal estimate of occlusion. That necessity has caused men to investigate, and to endeavor to work out the best and most scientific methods of procedure. It is true that just a few men have done the most in furthering the development of this specialty; but that is true in every specialty. At the same time, during the last fifty years a great many men have contributed, though perhaps in a modest way, to bring about the present status. Probably one of the most important items that Dr. Noyes has mentioned is the elimination of a great number of appliances that were formerly used. I have heard it said that at one time, before a large meeting, one man made the statement that he was the inventor of seventy-five hundred different forms of appliances to be used in the mouth for the correction of irregularities of the teeth. You can readily see that, if we had to deal with seventy-five hundred inventions from one man it would take a lifetime to acquaint oneself with the appliances alone, to say nothing of producing results by their use. The orthodontist, in that case, might be likened to the musician who attempted to master all the various kinds of musical instruments. The most important of all the factors mentioned was the recognition of occlusion, which I believe was originated by Dr. Angle. This has been indisputably the basis of all orthodontia as well as dentistry. By occlusion we mean the establishment of a perfect relationship between the relative sizes of the two jaws, which should come into perfect contact upon closure. Another result of the recognition of occlusion, which has proved to be of the greatest help to the orthodontist, has been presented to the profession by Dr. Angle in his classification of malformations and malocclusions of the teeth and jaws. A

great many orthodontists, however, do not accept that classification as the best. The *pro* and *con.* have been discussed for the last several years, and perhaps some few improvements have been added, but very little has been taken away from that classification, because it is so simple. The recognition of occlusion followed by the classification has done more toward classifying the knowledge of orthodontia and enabling orthodontists to work with definite results in view than any other one factor.

The essayist mentions the moving of molars distally by the use of intermaxillary rubber bands. These rubber bands, as you probably all know, are strung from one jaw to the other, so that there is a constant pull, if desired, upon the molars, and this force may be great or small as desired in each particular case. Dr. Noyes states further that it is as easy to move molars distally as it is to move incisors mesially. That is practically true, and I only mention this fact because a great deal of discussion has been going on recently relative to the advisability of moving the molars distally. The essayist did not state, however, that this procedure is advisable in every case, and he should not be misunderstood in this respect.

The future development of orthodontia depends, of course, upon a great many factors. There is no doubt that the future development, in a practical way at least, will depend upon the men who are actively engaged in producing practical results in the mouth, assisted, if you will, by the co-operation of the general practitioners of dentistry as well as of medicine. The medical man and the rhinologist are vitally interested in the work of orthodontia, and they are a necessary adjunct to our work.

Dr. Walter H. Ellis, Buffalo. It is only when we realize that a comparatively few years ago there were only one or possibly two men who devoted their entire thought and energy to the practice of orthodontia exclusively, and that today practically every city of note in the land has its orthodontist, that we can appreciate what progress has been made in this field. Orthodontists are "making good," their services are being sought and appreciated, which shows that orthodontia is truly coming into its own.

The title of the essay brings to one's vision a procession of all those grand old men who by their efforts have laid the foundation upon which the present-day orthodontist might build our great specialty. We must, however, pay special tribute to Dr. Angle, the product of whose genius has rendered possible our greatest success, his broad conception and outlook on the subject of occlusion and classification giving us our first real positive working hypothesis.

The fact that orthodontia has been separated from the general practice of dentistry, with its many exacting demands upon the time and attention of the practitioner, has probably materially contributed to its development.

The abandonment of the fallacy that orthodontia and regulating appliances were synonymous, and the delving into the problems of etiology, histology, comparative anatomy, physiology, pathology, and the art relations as involved in our specialty, have not only rendered better results possible, but have broadened the vision and the whole general outlook, stimulating the practitioners of orthodontia to further researches and still greater triumphs.

The intelligent co-operation of the

rhinologist with the orthodontist in the working out of many of our common problems is doing wonders for both specialties. Is it not strange that these two specialties, having so much in common, should be practiced under separate degrees, and, at times, almost with cross purposes?

There has naturally been an improvement in nomenclature, but this is still far from perfection, there being much diversity of opinion among authorities, many terms having been coined without etymological foundation. Even the name of our specialty has been assailed in a bewildering manner, the terms "orthodonty," "orthodontology," and "dental orthopedia" having been suggested as improvements over orthodontia. Personally, I have always used the more general term of orthodontia, but judging from curious callers who have visited my office, the public at large does not seem to have as yet accepted this term.

In closing, I would like to pay tribute to our essayist. Orthodontia is fortunate in having as one of its active practitioners an histologist of his note. His research work has thrown light upon those tissues with which we are most vitally concerned. He has taught us that teeth are not moved through a bed of putty, but through tissue, with whose structural development and behavior under stress we must be familiar if we would attain true success. His future work will undoubtedly merit our indebtedness as much as have his past achievements.

Dr. V. H. Jackson, New York, N. Y. I wish to compliment the essayist on his paper, and to say that I am not prepared to take part in the discussion, although I should have liked to argue a few of the points presented, which I think are worthy of consideration. The essayist's presentation has been an interesting and a convincing one regarding the work accomplished by Dr. Angle. Regarding a number of the points under discussion I should like to state my different views, but this being impracticable this evening, I wish to be excused from discussing the paper.

Dr. Carl B. Case, Milwaukee, Wis. I have listened to this paper with great interest. I heartily agree with the essayist that there has been altogether too much personal feeling, petty jealousy, and spite, which have been a great hindrance to the advancement of orthodontia. There is, of course, not a single branch of dentistry that has not had its quarrels and bickerings. What we need is chord and harmony, rather than discord and jealousy. In reference to this I shall speak later of the origin of the intermaxillary force, which has given rise to some petty feeling and misrepresentation. The main issue of the paper, which seems to be stimulated bone growth, is led up to by various misleading or false statements, not necessarily intentionally, but from a misconception of the state of affairs.

Occlusion was not discovered by Dr. Angle, but was recognized and appreciated in the days of Dr. Kingsley, who wrote thereon in his work on "Oral Deformities," published in 1880. Dr. J. N. Farrar in his publication of 1888 on "Irregularities of the Teeth" wrote of the importance of restoring or maintaining normal occlusion of the teeth. Dr. G. V. Black, also, in his incomparable work on "Dental Anatomy," published in 1892, fully described the normal anatomical relation of the teeth. From this it appears

that normal occlusion was understood and appreciated before Dr. Angle actively entered the field of orthodontia.

Naturally, in the infancy of orthodontia, when methods were crude and appliances extremely inadequate, it was not possible to accomplish as much in correcting occlusion as we do today. The dentist went as far as his knowledge and skill in tooth movement enabled him in correcting the alignment of teeth. He also considered causes as far as his knowledge and experience permitted.

It has been stated that "Teeth were moved without any regard as to where they were intended to be, and consequently they very seldom stayed where they were placed." This broadly infers that normal occlusion is the only factor in retention. I might answer this by asking the question: Why is it that teeth are maintained in malocclusion? As a matter of fact, the failures in retention were not due so much to ignorance of the histological structure of bone or other causes, nor of failure to produce a normal interlocking of cusps, but rather to the inefficient retaining fixtures which orthodontists were able to construct, and to their lack of knowledge of the necessity and requirements of retention.

As the science of orthodontia developed toward modern lines, the greater was the need for a variety of methods of applying force, in order that certain desirable tooth movements could be produced.

Today there are six recognized methods of applying force to the teeth. The vast number of appliances of which the essayist has spoken are all combinations or variations of these methods. Each probably possesses some slight or great advantage over another, and may be peculiarly applicable and efficient in the deformities for which it was devised, undoubtedly more so than any stereotyped apparatus could be. But these are purely the mechanical means of accomplishing the artistic end. The value of orthodontia from the artistic standpoint is measured by the harmony which can be produced, not only in the relationship of the teeth but in the lines and contours of the face, and facial harmony is always a matter of personal opinion among orthodontists as well as among artists and sculptors.

The rational orthodontist does not believe in maintaining the full complement of teeth under all circumstances, nor does he trust to nature to finish the work when once he has started it.

The essayist says of the orthodontist: "One possessing the knowledge that enables him to see through the tissues and interpret their biological response may acquire the skill to produce almost unlimited tooth movement." And again: "But without this appreciation of natural laws, no amount of skill will enable him to obtain good results, except by accident."

These radical statements are typical of the misconception under which the essayist is laboring. All the knowledge in the realm of biology will have absolutely no effect on the amount of skill a man may acquire in the mechanics and the art of tooth movement, nor will it have any effect on the retention of teeth.

But admitting, for the sake of argument, that the essayist's claims for the phenomenal growth of bone stimulated by tooth movement are well founded, why was it never observed until this late day? Why is it still necessary to construct special apparatus to produce the bodily movement of anterior teeth in case of under-development of maxilla or mandible? Why, also, after the bodily movement has been accomplished in a manner

which should be an aid to natural development, has there been such a tendency for these teeth to "go back," even after years of retention? Certainly not because of our lack of knowledge of histology or biology.

Nature has worked along the same lines and in the same way for fifteen years as she does today. Force was applied to the teeth at the same points and in the same direction with apparatus which was somewhat cruder, but which operated on the same principles, and yet today, because we have a greater knowledge of histology, nature must suddenly begin to develop bone! Truly, this is incomprehensible to me.

Every orthodontist of experience knows that teeth can be moved only with a certain degree of expedition, without producing an inflammatory process. This has been advisedly called physiological movement. He knows that there must be a slight breaking down of bone structure under pressure, and also a slight building up or development of new bone. But that it is possible for this development to reach the phenomenal proportions the essayist has claimed for it has yet to be substantially proved.

There might be a great deal said in refutation of Dr. Noyes' claims, but rather than disagree with him further, I simply ask for tangible evidence before accepting them as facts. As a rule, scientists, before proclaiming facts or laws to the world, exhaust every means in their power in attempting to prove or disprove them. Until stimulated bone growth is proved to be a fact by tangible and indisputable evidence, it is nothing more or less than a theory.

To refer again to the intermaxillary force; I have been much surprised to learn that Dr. Baker is still credited with the origin and development of this force, with entire disregard for the facts published under the captions of "Origin, Use, and Misuse of the Intermaxillary Force," and "Rise and Development of Intermaxillary Force," published in the DENTAL COSMOS for May 1904 and May 1907, respectively.

The publication at that time of the correspondence between the gentlemen concerned should have been sufficient evidence to establish beyond question the authorship of this method of applying force. But to repeat published facts, Dr. Jerry A. Robinson of Jackson, Mich., as early as 1868 employed the direct intermaxillary force of silk ligatures to aid the eruption of retarded teeth. Dr. Angle introduced the direct intermaxillary elastics for the sole purpose of extruding a single tooth, and published this method in the *Dental Cosmos* for September 1891. In February 1893, a variation of this force was introduced and has been used continually to the present time by another man for disto-mesial movement of the teeth of both dentures. During the same year several papers were read before dental societies and published by him, and—to quote Dr. Angle: "To fair minds, recorded dates are usually sufficient evidence of priority." This was some time, possibly a year or so, before Dr. Baker employed the same method with an entirely different object in view, that of "jumping the bite," and this method was employed only in the case of his son, as he admits in his correspondence.

In view of such facts, I am at a loss to determine why the intermaxillary force should have been termed the Baker anchorage, when Dr. Baker had absolutely

nothing to do with either its origin or development, as far as we have been able to learn.

It is no more trouble, and decidedly more just, to give credit openly to the man to whom it belongs rather than to one who has no claim or right to it.

But aside from personal feeling in this matter, I regret exceedingly that such a truly admirable appliance as the intermaxillary force should be so abused and misused as is indicated by its wholesale application for the sole purpose of establishing a normal occlusion of the teeth, without a care for the results which are reflected in the face, often with a disagreeable and undesirable effect.

The classification which Dr. Angle has so ably devised—not discovered—has bad features as well as good ones. It is certainly simple and apparently easy to understand, and for that reason it appeals to orthodontists at large. Its regrettable weakness lies in the fact that it does not recognize either unimaxillary or bimaxillary protrusions. The unimaxillary protrusions are invariably diagnosed as under-development of the other denture, and the method of correction aims at maintaining the full complement of teeth and establishing normal occlusion by intermaxillary force, regardless of the requirements from the artistic standpoint. In the bimaxillary protrusions, if the occlusion of the teeth is normal, the face is unfortunately proclaimed normal, and consequently is not corrected.

It is to be hoped that in time Dr. Angle will recognize these deformities and revise his classification accordingly.

Dr. Burt Abell, Toledo, Ohio. There is just one point in this paper that I wish to emphasize, namely, that dentists are not so much interested in the past as in the future of orthodontia, and in what orthodontists can do for their patients. It is dentists' duty to give their patients a clear idea of what the orthodontist is trying to do for them, and what can be accomplished in putting the teeth in normal occlusion. I practice orthodontia exclusively, and judging from the patients referred to me time and again by dentists, I find that the dentist has many times tried to straighten these teeth by a short cut, namely, by extraction, or has told the patient to wait until all his teeth have erupted. Consequently patients of ten, twelve, fourteen, or sixteen years of age have passed beyond the period of normal growth of the jaw, which stops at about eight years of age. The dentist, therefore, should preach to his patients the necessity of orthodontic treatment before the ages of seven or eight years, in order to secure the best results.

In regard to the inquiry made regarding the straightening of teeth in pronounced malocclusion in mature years, I would say that this requires great courage. If dentists would attend these meetings and hear all the papers on orthodontia, they would acquire a lot of knowledge that they have not possessed before. We should pay more attention to the results to be obtained than we have in the past. The dentist is not interested in the question whether the first molar is moved distally or not by the Baker anchorage or any other procedure, but he should be impressed with the fact that the orthodontist's duty is to make room for every tooth in the mouth, and in order to accomplish this, he must begin treatment early. Dentists should never extract teeth in young patients to correct malocclusion. The general form of the face and the fact that the teeth must be placed in the proper position to nor-

mally fill out the face must be taken into account. Short cuts will not do. Orthodontia must be practiced properly, or let alone.

Dr. MARTIN DEWEY, Kansas City, Mo. I will try to follow the suggestions of Dr. Noyes and avoid personalities as far as possible.

In regard to the discovery of intermaxillary anchorage, or as Dr. Angle justly called it, the Baker anchorage, I presume you are all more or less familiar with the discussions which have arisen over the priority of this discovery. The value of a discovery, whether it be an appliance, a scientific truth, or some form of anchorage, lies in the application of the principle more than it does in the priority of the discovery. It may be true that someone has used intermaxillary ligatures strung from the upper to the lower arches before Dr. Baker, but it remained for Dr. Baker to make use of such a force and by its use produce results that had not been accomplished before that time. After the publication of the sixth edition of Dr. Angle's book, in which he mentioned the possibilities of the Baker anchorage, and after his students and he himself had accomplished splendid results, our attention is called to an article that was published some time previous, in which the writer devoted but a few lines to the description of a case in which intermaxillary ligatures were employed, but the use of these intermaxillary ligatures were not properly described, as they were employed in conjunction with other forms of anchorage.

Whenever the question of the use of the intermaxillary anchorage has been brought up in times past, as it has tonight, some have claimed that it has always been used reciprocally in all cases; others, that, if it was applied reciprocally, the teeth which were to be moved forward would be moved more than those that were to be moved backward. In other words, the mesial movement would be greater than the distal movement of the teeth in the opposite arch. Dr. Angle has often said that the expansion arch was like a violin; one who has mastered it can do much, but one who has not can do nothing with it. In the intermaxillary anchorage we have an anchorage which, in the hands of those who understand its mechanical principles and the anatomy and histology of the parts under treatment, is capable of producing great results. We can move the upper teeth mesially and the lower ones distally, reciprocally. By that I mean, we can move them an equal distance; or the lower teeth can be moved mesially, and the upper teeth distally an equal amount. There are, however, but few cases in which an equal movement of the teeth in both arches is demanded. Another movement which can be produced by intermaxillary anchorage is the forward movement of the lower teeth, the upper teeth remaining stationary; or the reverse can be accomplished; the upper teeth can be moved distally, the lower ones remaining stationary, although I have never seen a case where that particular movement was demanded in order to produce the best results. Still another result can be produced, namely, a distal movement of the lower teeth, the upper teeth at the same time being held stationary, which is very often done. We can also move the upper teeth forward, and hold the lower teeth stationary. It is, then, possible to produce six distinct types of movement with the one anchorage, hence it is not surprising that the question of the use of intermaxillary anchorage is so confusing to a great many.

As to the development of bone as the result of mechanical stimulation, it seems that some light can be thrown upon this question from biological study, aside from the clinical evidence which we have. If bone does not develop as a result of mechanical stimulation, to what, then, is its development due? Briefly I will state that there are animals which do not possess an osseous skeleton. As we approach the higher forms of animal life, we find that osseous structures have developed for two distinct functions, *i.e.* that of protection and that of support and utility. The exo-skeleton belongs to the former, and the endo-skeleton to the latter form. There are so many evidences of the development of the exo-skeleton as a result of mechanical stimulation that I will not take much time to cite examples. As a result of mechanical stimulation through use, the placoid scales in the lower fishes have been modified into the specialized teeth of the higher forms. As Dr. A. H. Thompson has said: "It has been an adaptation of tools to function, and not one of function to tools." As the teeth have been developed as a result of mechanical stimulation, their support has been modified, until we have a special development of the bones of the endo-skeleton to support the teeth. In the fibrous attachment of teeth there is no special bony support; in the ankylosed teeth there is. We find the ankylosed tooth takes a position on the ridge of the supporting bone, or "bone of attachment" (Tomes) develops to support the tooth, and, when the tooth is lost, the bone is lost. The same is true of the alveolar process, which is bone in every sense of the word.

It would require several hours, at least, to cite all of the clinical evidence that could be advanced to support the fact that bone is being developed every day as a result of mechanical stimulation. The skeleton of an individual who takes active muscular exercise is always better developed as a result of such muscular activity, which is simply natural mechanical stimulation. In the proper adjustment of a regulating appliance, we only supply artificially the force which has been perverted, thereby producing the proper development of bone.

Dr. H. L. Ambler, Cleveland, Ohio. I am not an orthodontist, but wish to make a statement which may be of interest to orthodontists. On a recent cruise around the world, I had the pleasure of lecturing before the Odontological Society in Tokio, Japan. There I met Dr. Teraki, a native of Tokio, who has studied dentistry and has been graduated in Philadelphia. Upon returning to Tokio he took up the practice of orthodontia as a specialty, and in my cruise, covering some thirty thousand miles, he was the only person I met who is making a specialty of orthodontia. Dr. Teraki, after the meeting, said that it was very difficult to obtain patients, and he was somewhat discouraged. I told him what our orthodontists were doing in this country, which gave him great encouragement, and he said, when I left, that he would keep on with the work. I make this statement to show that orthodontists in the United States have done some good work which has encouraged men to take up this specialty in foreign lands.

Dr. Noyes (closing the discussion). I wish to apologize to those who were appointed to discuss my paper for not supplying them with copies sooner, but I was prevented from doing this by circumstances over which I had no control, and for which I am more sorry than they are.

The points of my paper have already been discussed *pro* and *con.*, and most of the issues that I might have wished to answer have been defended by someone else.

My object in writing this paper was, if possible, to trace the development of orthodontia in logical sequence, so that the general practitioner might gain some idea of the steps of the development of this specialty. I have referred particularly to the application of the intermaxillary force to a certain purpose, and two of the speakers have seen fit to assail that purpose. It was the purpose that I was emphasizing, because it has a definite relationship to the previous development of fundamental facts, and rendered possible the further development of these facts. I stated that the beginning of the development of orthodontia as a science was marked by the recognition of the fact that occlusion from the orthodontist's standpoint is more than cusp relation; yet two of the speakers objected to my giving the credit therefor to Dr. Angle, saying that cusp relation, which they call occlusion, had been described before. It was the discovery of something more than cusp relation that marked the beginning.

In regard to the question of bone-growing, mentioned by Dr. Dewey, I would say that, if anyone is willing to fly in the face of the evidence of the whole range of biological science, he can take exception thereto. But, as Dr. Dewey has said, the proof of bone formation, not only in response to mechanical stimulation of a physiological nature, but also to mechanical stimulation of an artificial nature, has been fully furnished. I have spent within the last two weeks many hours over sections which showed not only bone development in the living animal, but which illustrated the laws under which bone will grow, not in a haphazard way, but following definite, fundamental laws. That work is soon to be published both in this country and in Europe, and, as I said in the paper, will furnish a very important factor in this field.

The next order of business was the reading of a paper by Dr. E. M. KETTIG, Louisville, Ky., entitled "Adapting Full Rubber Dentures," as follows:

Adapting Full Rubber Dentures.

By EDWARD M. KETTIG, M.D., D.D.S., Louisville, Ky.

I HAVE selected as my subject the adaptation of full vulcanite dentures because it is safe to say that we are making many more vulcanite plates than any others, collectively speaking, and naturally these are of the greatest interest to us.

When intending to construct a full denture on vulcanite or any other basic material, we find that if the plate is to have the adaptation to which the patient is entitled, many points in the construction must receive our most careful consideration. Just as the strength of a chain is equal to the strength of its weakest link, so in a full denture any defect

in one of the many details of its construction impairs the usefulness of the denture as a whole.

PREPARATORY EXAMINATION OF THE MOUTH.

The first step in the work of constructing a denture is to make a thorough examination of the mouth. This is usually carelessly done, and should receive more thorough attention. If we are to really adapt the proposed plate to the area of tissue presented, we must know the nature of the tissue. Age and sex play a part in edentulous arches, but each case presents individual characteristics of its own. We must study the topography of the parts. In the upper arch we should ascertain the hardness or softness of the parts and the dimension of the alveolar ridge, and see especially to the muscular attachment. Ligamentous or cicatricial attachment of the submucosa, present at times along the line of the bicuspids or molars, is found to be too near the level of the ridge, and in some cases attached beyond the ridge, rendering it impossible to adapt a plate without surgical interference. The compression to which the plate area may be subjected without irritation should also be determined, for unless this feature of our work is considered to its fullest extent we need not expect the denture to render satisfactory service while in use. The limits of the plate, its permissible extent on the plaster model, should be well calculated, and a digital examination in all directions be made, with a view to thoroughly acquainting ourselves with the conditions before proceeding with the work. The lower arch should likewise be studied, only more carefully, if possible, as the plate area is smaller, and the conditions are more complicated than in the upper arch.

TAKING THE IMPRESSION.

While plaster in partial cases is probably the most reliable material for taking impressions, I have not been able to obtain the coveted results in taking impressions for full upper and lower dentures. I shall probably be censured for such a statement, as plaster is generally considered the material *par excellence* for all impression work. My object in taking an impression for a full upper denture is, after having accurately fitted a tray, to use a material that will produce the greatest amount of compression of the gum tissue. I am careful not to displace the tissue, but if we are to adapt a plate so that it will not be displaced in the act of mastication, we should compress the tissue, using as much pressure in taking the impression as we expect to be employed when the denture is in use. This is more important in cases of very soft mouths than in those of hard bony character, as in the former the tissue yields more readily to pressure, and a denture made from an impression taken while the tissue is in a state of repose would be of little service when pressure is brought to bear upon it.

My method, after selecting the proper tray, consists in inserting warm impression compound in sufficient quantity to reach all the area to be reproduced, the S. S. White compound being good for this purpose. The tray is then inserted, and the material pressed half way to place. It is then removed and inspected, to ascertain whether it is being properly directed, any surplus compound is trimmed away with shears, and the material readjusted in the mouth and pressed home in such a way that it

spreads beyond the limits of the plate to be constructed. The impression is then removed and chilled, representing a matrix closely approximating the form of the mouth. By trimming away the surface of this impression to the extent of an eighth of an inch in every direction, assurance is obtained that when a new layer of compound is added, it will be equally distributed, as every part of the tray is about the same distance from the oral tissue. For the new layer the Detroit compound is used, for it softens at a lower temperature, and produces an accurate impression. This compound is softened and spread in a thin, even layer over the inner surface of the first impression. The tray is then quickly introduced into the mouth and pressed into position with all the force that can be reasonably applied. In this way the material reaches every rugosity of the mouth, and the compression of the softer tissues is secured which is so much desired in the adaptation of the plate. After this impression has been chilled and replaced in the mouth, it should stick tightly. If it does not, some error has been made in the technique.

THE MODEL.

From this impression the model is secured by using the best quality of builders' plaster, mixing it medium stiff, and adding a small quantity of Portland cement. This model should be quite hard and smooth, and should reproduce exactly the entire area to be covered by the plate. All surplus plaster should be trimmed away, and the model should not lie about the laboratory for several weeks before it is used, but the plate should be made without delay, as time does not improve the model, after crystallization has once been completed. The model is then a reproduction of the mouth with the tissue compressed, yet some alterations are necessary in the majority of cases to allow for still greater compression in certain portions of the mouth and for relief in others.

FINAL CORRECTIONS OF THE MODEL.

These alterations should be made upon the model while the patient is seated in the chair, examining the mouth and adding to or taking from the model as the case may demand, judging from digital examination of the parts. If the ridge is prominent, the arch high, the soft tissue scant, alterations on the model should be confined to the posterior portion of the plate. If palatal nodules are present, relief must be provided by spreading over the model which represents these bony protuberances, one, two, or three layers of No. 60 tin foil, according to the prominence of these deflections of the palate bone. If in the case under treatment the hard and soft tissues are equally distributed, and no undue amount of either is present, the model should be scraped toward the posterior portion, especially deeply toward the posterior border of the proposed plate. All along the sides of the model, where the plate is expected to exclude the air when drawn against the tissue, it is best to take off some of the plaster. Holding the model against a stiff brush-wheel on the laboratory lathe and brushing off a thin layer of plaster all around is an effective method, which produces a plate that will lie closely to the sides of the ridge without producing irritation. If the mouth has an unusual amount of soft tissue, and there is not much evidence of bony structure, the model should be scraped considerably posteriorly, also along the sides, with the brush-wheel. In obtaining an

impression of such mouths, where the anterior alveolar ridge presents mostly soft tissue, care should be taken to secure the greatest amount of compression without displacing the tissue. In the case of lower models no alteration is desirable, and the nearer the model is a reproduction of the tissue itself without compression, the better the plate will do.

ARTICULATION.

The bite should be secured by obtaining the correct relationship on the articulator, being sure that the condyles are at rest in the glenoid cavity. In cases where all the teeth have been lost for some years, and no artificial denture has been worn, the condyles have no special resting-place, and the original condyle path must be re-established; yet placing the jaws as nearly as possible in their normal position is no easy matter. In old age the obtuse angle of the lower jaw, even when a denture is worn, becomes more pronounced, this being a factor to be reckoned with in the adaptation of full plates. Cusps upon molars and bicuspids are no longer useful, in fact they are in the way, and the looseness of the mandible and the many movements of the lower jaw prevent a constant occlusion in one place. The angles of force in mastication should receive due regard in the arrangement of the teeth, so that all pressure brought to bear on the upper or lower teeth should be directed toward the center of the mouth. It is better to have the teeth so arranged that the arch in the posterior portion will be too narrow than too wide, as the fit of the plate is usually destroyed when the molars flare out into the buccal walls too much off the center of the ridge, no matter how accurately the plate is adapted otherwise. Anatomical articulation of the teeth is no doubt the correct principle in arranging artificial teeth, but occasions arise when these rules cannot be adhered to strictly, and we must arrange teeth according to age and conditions.

INVESTING AND VULCANIZING.

After all these details have thus far been complied with, the flasking should be most carefully done. The wax model should be covered with heavy tin foil, if the finished plate is to possess a surface as free from porosity as possible. The plaster for investment should be of the hardest variety obtainable, since great stress is brought to bear upon it laterally when the bolts are tightened, and it is subjected to compression to a marked extent. Escape gates for surplus rubber should be liberally provided, so as to overcome undue pressure. An otherwise beautiful piece of work is often ruined by improper vulcanization. We are all apt to be in too big a hurry with our work, and vulcanize too hurriedly. If from one to one and one-half hours are allowed for the temperature to reach the low point of 260°, and this temperature is retained for from four to five hours, far better results would be obtained than by vulcanizing too hurriedly. It is hard to believe that there is such a difference in the quality of the vulcanite, yet it goes without saying that the adaptation of a slowly vulcanized plate is far more perfect than that of a poorly vulcanized denture.

Discussion.

Dr. G. H. Wilson, Cleveland, Ohio. The essayist has presented many thoughts that we can commend, yet I feel that he is not accomplishing all that he might. He certainly has shown that he is thorough in his work, so much so that he is

not satisfied with taking one impression, but builds up that impression anew and develops it. That is a correct idea, but in my opinion we must go farther back and study the case a little more thoroughly than the essayist has indicated. He points out that we must make a thorough examination of the mouth, but what are we to look for? The shape of the mouth has very much to do with the work, but not everything; size also, and the condition of the tissues, whether dense or soft and flabby, and the patient's age, are important factors. The tone of the tissues is very much interfered with as the patient grows older, the tissues relaxing either owing to illness or age. The tissues will then not retain a denture so well, so that in old age the same good results cannot be expected as in young people, the same rule applying to persons in ill or good health. The fluids of the mouth have much to do with the retention of artificial dentures, because there must be perfect contact between the denture and the soft tissue, which is difficult to obtain in a ropy condition of the fluids of the mouth. The more closely we approach absolute contact, the better the retention of the denture will be. The effect of shape on retention is illustrated by taking two flat pieces of glass moistened with water and held together by adhesion, any effort to pull them apart directly being met with considerable resistance; but if the force is applied laterally, the plates will easily slide apart. In the first instance pressure is exerted at right angles to the surfaces, while in the latter case the pressure is applied laterally. If, therefore, high prominent ridges are present, the plate will tend to slide off, while with flat surfaces they will tend to adhere strongly. The reason why in some flat mouths dentures do not hold as well as they do in others must be attributed to other conditions than form. If the tissues are soft and poor in tone, the denture will, of course, not be perfectly retained.

The essayist has laid stress upon the impression as being an important factor, and this is indeed the foundation upon which we must build our work. The important feature in taking the impression is to secure as close adaptation to the bony walls as possible. In this respect I would disagree with the essayist's taking an impression with modeling compound. He states that in nearly all cases the impression and cast must be modified afterward, for the reason that the desired compression has not been obtained. Even if we had a material of uniform plasticity throughout, it is impossible to compress one part strongly and the other lightly. The material has no selective power; the operator must select and apply the force where he desires it. This can be accomplished by using two materials, one hard and firm, the other soft. If a layer of wax is built on an impression tray, the wax softened and conformed to the mouth, and pressed into place, pressure can afterward be produced at the desired places. This impression is filled with soft plaster and replaced in the mouth, and the hardened wax will enable the operator to compress the desired tissues, the other tissue not being compressed because of the intervening soft plaster of Paris. After thus building up the tray with wax for each individual case, with the use of plaster the desired contact can be secured. The changing of an impression after it is taken, I consider dangerous. By using wax to form the tray, and plaster for the impression, we can obtain the best adaptation possible, and for that reason I see no use for modeling com-

pound. The essayist, nevertheless, has presented his subject in such a way as to show us that we need something more than an ordinary impression.

Dr. D. J. McMillen, Kansas City, Mo. I wish to commend the essayist for having the courage to read a paper on the subject of prosthetic dentistry, which is almost a lost art. There are very few students who care to practice this specialty of the profession nowadays. The present tendency is to take impressions and send them to a laboratory, which in my opinion is entirely improper. No mechanical dentist can make a plate for a patient as well as the operator who takes the impression.

There are a few points in this paper which I would like to take exception to. In the first place the essayist speaks of making a thorough examination of the mouth. That may be a good idea, provided the operator learns the peculiarities of that mouth by such examination. I usually take an impression to the best of my knowledge, following, however, neither the essayist's nor Dr. Wilson's method. I consider it valuable to have a certain variety of methods, my own method of taking impressions being as follows: First, an impression is taken in modeling compound, then creamy plaster is poured into the compound impression and reinserted in the mouth.

The essayist speaks of pushing the soft parts away. Personally, I wish to have the soft parts as near their natural position as possible. The essayist, in my opinion, spoils a good impression by scraping and cutting it. An impression that stays well in the mouth should not be scraped at all. Rather than scraping I would build it out. The cast can be built out with wax or foil, because it is in plain view, while the scraping of an impression can be done only at random. To my mind, however, it is best not to touch either the impression or the cast.

The essayist says that in the construction of dentures it is very important to follow the details step by step, as, if we make one mistake, the denture will be spoiled. I have made many plates over, some several times, and no one should expect to make a perfect denture in every case at the first effort.

Dr. H. J. Goslee, Chicago, Ill. When we look back upon the efforts of Kingsley, Haskell, Ames, and many others, directed toward this subject for so many years, we might wonder at the courage displayed by the essayist this evening in presuming to interest an audience in the discussion of the subject of adaptation of dentures. Yet if anyone would pause to think for a moment of the great number of failures which are being daily made in the effort to bring about such an adaptation of dentures as will render them successful and useful, one can readily realize that the gentleman who presumes to present such a subject is not possessed of temerity, rather of a knowledge of the fact that these failures are due to specific causes. Failures in the adaptation of artificial dentures, particularly upper ones, are mainly due, first, to the lack of close examination to which the essayist has called attention, and secondly, to the unequal resistance offered by the tissues upon which the upper denture is to rest. To overcome this unequal resistance it is necessary to equalize the pressure of the denture. An upper denture, to be properly adapted, in my opinion, must not be in absolute contact all over, notwithstanding the remarks of some of the previous speakers. Instead of being in absolute contact, it should come in contact only with the soft tissues

of the mouth. The pressure in mouths which offer such a varying degree of resistance cannot be equalized unless the possibility of the denture coming in contact with the hard tissues of the mouth is prevented, and this can be effected only by reliefs. The difference in the thickness of the soft tissues, which varies in various mouths, must be known to the operator, in order that he may produce this relief. This can be accomplished, as the essayist suggests, by the manner in which the impression is taken. Dr. Kettig probably supposed that I would differ with him in regard to taking impressions in modeling compound. Modeling compound, however, when properly used will furnish an impression that possesses in many instances advantages over plaster alone, particularly in cases where there is an abundance of soft tissue. I agree with the essayist that we should compress the soft tissues in such cases, and that this cannot be obtained by the use of plaster alone. It can, however, be accomplished by the use of ordinary base-plate wax or modeling compound. In all cases where there is a marked difference in the amount of hard and soft tissues, which indicates the resistance that the tissue will subsequently offer to the plate, I believe something should be used which will compress the soft tissues, without displacing them. A better method, I believe, than the one suggested by the essayist, has been devised by Dr. Prothero of Chicago, who agrees in the view that the soft tissues should be compressed as much as possible without being displaced. This is obtained by taking an impression as indicated by the essayist in modeling compound, forcing it well to place, removing it and trimming away any unnecessary surplus, then passing the surface of the impression over the flame without heating it so as to cause discomfort to the patient. Instead of placing the impression in hot water for the purpose of softening it, only the surface is softened with dry heat. In this way a better impression is obtained than by wet heat, as suggested by the essayist. In using modeling compound we must be careful of that class of cases where there are undercuts and soft, flabby tissue in the anterior portion of the mouth, which would be displaced. In such cases, in order to preserve the advantages of the soft tissue, the impression is first taken in modeling compound, the area that covered the soft tissues and the flabby portion of the mouth is cut away, that space filled with plaster, and the impression reinserted in the mouth and forced to place.

If a proper examination has been made and a good impression has been obtained, which is best accomplished with slight pressure, then the denture must be prevented from riding upon the hard tissues. In this connection permit me to call your attention to a statement made by Dr. Haskell so many times, namely, that ninety-five per cent. of edentulous upper jaws present a hard central ridge. This is the only part of the upper jaw which does not change, ninety-five per cent. of cases exhibiting that hard ridge. In such cases, if there is considerable soft tissue on either side of this hard central ridge and perhaps a large portion of soft tissue covering the ridge itself, pressure is required to compress these tissues back to normal condition, and to secure a denture which will ride upon the soft and not on the hard tissue. This is to be obtained only by the relief. This relief may be secured by reducing the impression or adding to the model by some means so as to prevent the denture from riding upon

the hard central ridge. There are various means of obtaining these reliefs. I believe a great many practitioners obtain them by building up the model with thin plaster and a brush, or with tin foil. In my opinion this can be done with a greater degree of accuracy and certainty by scraping the impression. The question has already been raised as to how we shall know how much to scrape. It is true that there is a degree of uncertainty as to how much to scrape, but that is a matter of experience, and of studying the amount of soft tissue as compared with the hard central ridge.

Dr. McMillen says that he does not see any difference in mouths, if he can obtain a perfect impression. He does not know whether he has a perfect impression or not until he knows the character and the comparative amount of hard and soft tissues. If the impression and model are prepared in such a manner as to insure relief and prevent the denture from riding on the hard tissue, thus coming in contact only with the soft tissue, and if the proper marginal outline is observed, then the accuracy of adaptation will be most satisfactory.

Dr. H. V. Cottrell, Columbus, Ohio. I wish to commend the essayist's manner of using modeling compound in taking impressions. If it is to be used at all, the method which he has described is the only effective one. I do not like the element of uncertainty which he has allowed to enter into his plaster cast, and which can largely be eliminated by the use of a uniform mixture.

I would make an exception to the rule that has been stated concerning the modification of the lower ridge. The very narrow-crested ridge requires relief as certainly and as carefully as the nodules in the upper jaw, the greater amount of pressure being exerted on the sides of the ridge, where it will be borne with much less resultant irritation than if the crest were to bear it entirely.

The essayist does not state definitely his manner of making escape-ways for excess rubber, but I am sure that he favors their being made inside the flask and as closely to the plate mold as possible, so that the pressure resulting from closure of the flask may be reduced, thereby avoiding some of the ill effects following compression of the plaster.

In my opinion, too little has been said in the paper about the arrangement of the teeth. This arrangement should be so well worked out that the overbite will be determined by the condyle path; it should be so definite that in the different excursions of the mandible a perfect balance of the dentures is maintained; it should be made primarily for the purpose of mastication, yet so carefully executed that all the requirements of leverage are satisfied. Such arrangement cannot be made in a few minutes, neither is it apt to be made at the dental laboratory, but it is of vital importance for the best interests of the patient, and certainly for the satisfaction of the professional worker.

Dr. S. C. G. Watkins, Montclair, N. J. I am very much interested in this subject. Contrary to the essayist's procedure, I would not generally take impressions with modeling compound.

First, the mouth should be examined, as he states, and the mucus washed away, so that when the impression is taken there will be close adaptation. The impression should be taken first with wax, and after removing it from the mouth the wax, while it is still soft, can be pressed with the finger all around the outer rim so as to leave room for plaster when necessary. The wax is then turned up a little at the

back of the wax impression so that it will prevent plaster from flowing back into the mouth. This method insures a good impression cup suitable for the mouth under treatment. Plaster is then mixed to a creamy consistence, placed in the wax impression, carried to the mouth and pressed to place quickly and firmly with considerable force. The object of the wax impression cup, which fits the mouth very accurately is to carry that thin plaster up into the tissues. By holding it firmly in that position until it is set thoroughly, a well-fitting impression is secured, from which a well-fitting plate can be made if the further details of the work are carefully carried out. I would not advocate scraping the impression, as Dr. Goslee has suggested. If anything were to be done to the impression, I would add to it, but scrape the model wherever there is a soft portion in the mouth, until I am satisfied that the model is cut down sufficiently to allow for the thickness of tin foil which I use, also that the finished plate will press very hard on all soft parts. I have scraped in some cases as much as an eighth of an inch. The model should be scraped not only in the middle of the soft portion, but wherever the tissue is not absolutely hard. If there is a hard bony ridge in the center of the mouth, the corresponding portion of the model is not to be scraped, but from one to four thicknesses of tin foil are built up so as to secure relief. Occasionally a hard bony ridge is found in the region of the second bicuspid and the first molar, and these places must be relieved by placing tin foil on the model. All other portions excepting the rugæ and the hard areas should be scraped. Subsequently small pieces of tin foil are placed on all hard places as described, and one thickness of No. 60 tin foil is placed all over the model and burnished down so as to secure a smooth surface on the finished plate. If tin foil is used in this manner, the worst case of rubber sore mouth can be cured within two months, because when the plate is vulcanized with the tin foil on its back, the rubber will not be forced into the plaster, which renders the plate as rough as sandpaper, but the back of the plate will be smooth like the front, and the density of the plate will almost equal that of a metal plate, so that no absorption of oral secretions or subsequent fermentation and irritation occur, which cause the much-talked-of soreness of the mouth. I find it very advantageous to place tin foil on both sides, the result being a very dense plate, which does not absorb the secretions of the mouth, nor irritate or cause inflammation of the mucous membrane.

Dr. Ross Porter, Oil City, Pa. We all seem to differ in our opinions as to the method of procedure in making plates. One of the speakers has made the statement that he equalizes the pressure, but for my part I have not yet seen the prosthetist who could do that. Under the conditions met with in the mouth, pressure is exerted in various directions, and in the case of a plate two hard ridges or surfaces are present with a cushion between them, *i.e.* the soft tissue of the mouth. The pressure can be equalized as far as the force in one direction is concerned, and as long as the pressure is brought to bear upon the center of the plate and at right angles, but the moment the pressure is applied in any other direction, it is not equalized. The only way to overcome this condition is to have the plate rest a little more heavily on the corners.

In taking impressions I use modeling compound in preference to wax. The

objection to wax is that sufficient stiffness cannot be obtained. I take an impression in modeling compound, then have the patient draw the muscles down, in order to get the outlines of the muscles, and scrape the impression a little in the bicuspid and palatal regions, where there are hard ridges. Then I place soft plaster in the impression, and retake the impression, after which the impression is again scraped a little in the bicuspid and in the palatal regions in order to secure some relief there. Then the cast is poured, the rest of the scraping to be done on the model. The scraping must not be done promiscuously, but for the purpose of securing a little more pressure on the corners. To secure this, hard base-plate wax is adapted to the model or cast, placed in the mouth, and tested with the finger to ascertain whether it rocks or not. If any of the methods described, with the possible exception of Dr. Wilson's method, are followed, it is probably safe to say that very few plates will not rock to some extent.

In mouths exhibiting an excessive amount of soft flabby tissue, I have come to the conclusion that satisfactory results cannot be produced without a surgical operation. I have not had courage enough to insist upon that principle, and I would like to have it discussed by others.

Dr. WATKINS. Scrape the model.

Dr. PORTER. I have scraped as much as possible, but I have been unable to obtain satisfactory results in those extreme cases.

In taking an impression, Dr. Wilson seems to obtain the greater pressure desired by using wax, making therewith a first general impression of the mouth, and raising the tissues at the desired points. By that method, if the operator is skilful enough, he may produce pressure at the places desired, but many of us will have to adopt other methods.

Dr. A. P. BURKHART, Auburn, N. Y. I congratulate the essayist on having the courage to present a paper on a subject which is important to every member of the dental profession, irrespective of the length of time he has been in practice.

There are three factors which I believe are very important in this work, namely, examination, impression, and general attention to the mouth as far as relief and pressure is concerned. Every mouth, especially the upper jaw, can be fitted without the usual devices which have been on the market for the past few years, provided an examination is made first, the mouth is cleansed as much as possible of fluids, and then the impression is taken.

The discussion shows that every dentist, no matter where he resides, has his own method, and produces results in his own particular way. While modeling compound is an excellent material for taking impressions, still I believe that it is of greatest value when used in combination with plaster. This method I have followed for a number of years, with pleasing results.

I take an impression in modeling compound as accurately as possible, remove it from the mouth while it is in a semi-rigid condition, and then, at the heel where the impression comes in contact with the soft palate, attach a small roll of beeswax. I then instruct the patient to carefully cleanse and rinse the mouth with water which is quite hot, whereupon I fill the modeling-compound impression with plaster, and thus secure the final impression. The wax at the heel which is added to the modeling-compound im-

pression has the effect of carrying the plaster firmly against that particularly soft part of the mouth. If the impression is satisfactory, I examine the mouth for hard and soft portions, and then and there is the best time to provide for the needed relief over the hard parts, whether the denture is to be made of vulcanite or with a metallic base. A strong model is then poured, using plenty of Spence's plaster. For a number of years this plaster has given me the greatest satisfaction in the making of models. I do not allow the model to remain in the impression for more than one or two hours. I have known dentists who were in the habit of leaving models in an impression for four or five days, which in my opinion is bad practice. If the model is satisfactory, I scrape it over that portion which comes in contact with the soft palate, and thus secure pressure or close contact with the soft parts of the mouth. Provision for relief in the region of the central or bony ridge of the mouth is made in the impression. In mouths in the anterior portion of which there is considerable soft flabby tissue, an impression can be secured which will enable one to construct a denture that will soon correct this condition, and bring about a hardening of the soft tissues. After obtaining an accurate modeling-compound impression, the portion which covers the soft tissue is cut out and filled with soft plaster.

I am inclined to criticize the essayist for his manner of mutilating his models for the purpose of obtaining ideal contact.

This particular specialty of dentistry has been greatly neglected by the profession, many dentists sending their work to laboratories. This work ought to be superintended by the operator, in regard to taking the impression and setting and waxing up the teeth; yet this is often being left to the laboratory man. The man who makes artificial dentures must be an artist from beginning to end, and every step must be accurate, if the best possible results are to be obtained.

Dr. KETTIG (closing the discussion). The reading of this paper has demonstrated the fact that it is a poor set of doctors who do not disagree.

Owing to the lateness of the hour, I simply wish to thank those who have taken part in the discussion. I especially value the presence of Dr. Wilson, whose manifold duties during this meeting render his attendance all the more to be appreciated.

Section I then adjourned until a later session.

THURSDAY—Second Session.

The second session of Section I was called to order on Thursday afternoon at 2.30 o'clock, by the chairman, Dr. Stanley L. Rich, Nashville, Tenn.

The Chairman announced as the first order of business for the section the reading of a paper by Dr. CALVIN S. CASE, Chicago, Ill., entitled "The Question of Extraction in Orthodontia," as follows:

The Question of Extraction in Orthodontia.

By CALVIN S. CASE, M.D., D.D.S., Chicago, Ill.

It is not intended by this essay to undervalue in the slightest degree the importance of the many valuable scientific papers which have emanated from the new school of orthodontia. The awakening of interest and investigation by many vigorous scholastic minds in this department of dentistry has given us a better understanding and appreciation of the importance of the teeth, their development in the individual, and the influence they exert in normal and abnormal relations upon associate bones of the human physiognomy.

No one can read Dr. C. A. Hawley's paper read before the District of Columbia Dental Society in 1910 and feel that he has not been instructed in regard to the co-ordinating forces at work between the teeth and the jaws. While I may not fully agree with all his tenets, as I do not agree with every claim and hypothesis of other writers, I gladly sift out the main portion, which I know to be true and valuable, and am grateful that we have men in the profession who are devoting their intellects and skill to the advancement of dentistry.

It is hoped that on this occasion at least my views will be answered in the same spirit of good-will with which they are being presented. It is only by threshing out differences of opinion that true progress is possible. No man is so great that his views are unassailable, and when he imagines otherwise, he is very liable to venture into the realms of the fantastic.

THE PROBLEM OF CAUSES AS GOVERNING IN ORTHODONTIA.

The question of extraction is so intimately bound up in the question of causes, that I hope to be excused if in the course of my paper I shall dwell at some length upon this phase of the subject, even briefly presenting a few associate principles of biology and ethnology.

It depends largely upon whether it is true or untrue that malocclusions of the teeth are due wholly to local causes, as proclaimed throughout the entire writings of the "new school," or whether they do not, partly at least, arise from the law of heredity and from other laws which govern the development of plants and animals, and especially to laws which govern the mixture of dissimilar types. If it be true, as is claimed, that the sizes and relations of the teeth and jaws and associate bones of the skull are intended to be in the individual in perfect harmony as if stamped by the Creator, and that when found to be otherwise, correction of the facial outlines is possible by the aid of artificial forces, with a preservation of all the teeth, then the extraction of sound teeth in orthodontic operations is certainly malpractice.

Upon no other basis but the Bible theory of special creation can I reconcile the teaching that nature never puts teeth into an individual's mouth that do not belong to his or her physiognomy, etc. While I should dislike to destroy or even

weaken the theological belief of anyone who finds comfort in his religion, I feel that a question of such importance demands the whole truth from the advanced standpoint of evolution.

There seems to be a tendency on the part of many prominent writers in the field of orthodontia to attribute all the physical departures from the normal to degenerating or growth-perverting influences acting on the individual after birth, and that this is the only cause of malocclusion of the teeth. Moreover, the belief is quite prevalent among educated people who have not given special study to the principles of biology, that the variety of forms which we see about us in both flora and fauna has arisen through the propagation of physical variations that are produced in the individual by the influences of environment; and that this is the principal if not quite the sole force and method of evolutionary development. For this reason—they argue—local influences in the form of artificial stimuli can be made to accomplish a wonderful amount of overdevelopment in parts of individuals, regardless of the inherent form. Nothing could be further from the truth, as I will endeavor to show later by a cursory review of some of the basic principles of biology and ethnology.

RULES RELATIVE TO EXTRACTION IN ORTHODONTIA.

At the outset I wish to make it definitely understood in what proportion of cases as compared to the whole number of malocclusions we of the rational school of orthodontia advocate the extraction of teeth in the operation of correction. My object in doing so is—First, inasmuch as an essay of this character necessarily is based more or less extensively upon a large number of practical cases, a listener is quite apt to obtain the impression that we practice extracting for a far larger number and variety of cases than we really do. Second, since it is so common to find in print perverted and untruthful statements in regard to our teaching, I feel called upon at this time to endeavor to disabuse the minds of many who have thus been misled.

For many years I have repeatedly published in various wording the following rules relative to extraction in orthodontia:

"Never extract teeth for the purpose of making the operation of correction easier, for whatever the malocclusion the teeth can always—or with very few exceptions—be placed in arch alignment and in normal occlusion, and in a very large majority of all cases they are needed in the arches, not only to perfect occlusion but to aid in beautifying the facial outlines. Therefore, so far as the relations of the teeth to each other are concerned, no *dental* malposition should be regarded as a basis for extraction."

"No teeth should ever be extracted in orthodontia except in cases of excessive protrusions producing decided facial deformities, or at least marked dento-facial imperfections—and not even then, especially in young children, unless there is every indication of an inherent protrusion that will ultimately mar the beauty of the face for life."

"In nearly all locally caused malocclusions in immature arches, the final development of the jaws and general growth enlargement of the features demand all of the teeth and their sustaining alveolar arches to harmonize the facial relations. Therefore in every case in which dento-facial protrusions can be corrected without extraction we should strive to pro-

duce a normal occlusion, not only for the sake of its more perfect masticating forces, but because of its normal developing influences upon associate bones. A very large proportion of protrusions which demand extraction for their correction arise from *inherent* causes, or from influences operating before birth, and not from local causes"—a theme of my subject which I shall refer to later.

RULES FOR EXTRACTION APPLIED TO THE ANGLE CLASSIFICATION.

Now let us see what proportion of cases come under the head of extraction in a conservative and what I am pleased to term a rational practice of orthodontia. In order to make my remarks as intelligible as possible to the largest number, I will adopt in this paper the dento-occlusal classification introduced by Dr. Angle, because it is the classification now generally accepted and consequently the one best understood. Moreover, it is the only rational classification for all who believe that in every case of irregularity the full complement of the teeth should be preserved, and when placed in normal occlusion will produce the only true facial result for that individual.

My objection to this classification has arisen from the fact that the occlusion or malocclusion of the buccal teeth gives no indication of the real position of the dentures in relation to facial outlines, which, after all, is the only true basis of diagnosis; therefore after determining the malocclusion and classifying it under the occlusal head, I would still have to find out "what's the matter," in order to apply the proper treatment.

Of the patients who apply for correction of malocclusion in my practice about three-fourths may be placed in Dr. Angle's class I, the buccal teeth being normal in occlusion disto-mesially, or nearly so. Out of this class of cases there is probably not more than one twenty-fifth —or about one case in thirty as compared with all cases of malocclusion—in which the slightest thought should be given to extraction. These are the decided bimaxillary protrusions, or protrusions of both the upper and lower dentures in relation to facial balance or dento-facial harmony of the individual. (See Fig. 2.)

I will show that even the most extreme forms of this type are not so very uncommon, producing decided facial deformities though the buccal teeth are in normal occlusion. When it is considered that this form arises in every gradation of dento-facial protrusion from the most extreme to the normal, it is time that advanced orthodontists cease to close their eyes to a recognition of its legitimate place in dental orthopedia.

In Dr. Angle's class II, or distal malocclusion as it is called by some orthodontists, the upper teeth are far in front of normal occlusion with the lowers, being commonly found in full mal-interdigitation. One type of this class arises in my practice in about every ten cases. About one-half the number of the cases do not present protrusions of the upper denture, except to a slight degree, but are characterized principally by a decided retrusion of the lower denture in relation to the mandible and the upper denture. (See Fig. 23.) It would be rank malpractice to extract teeth for the correction of this dento-facial type of malocclusion, as will be shown.

In the other half of this class, however, which is composed, first, of a variety of upper protrusions, the lower denture and mandible being normal, and second, those

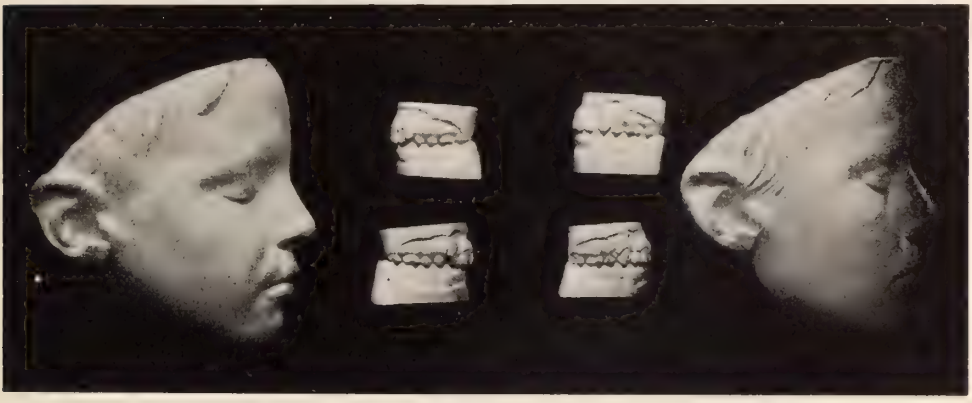
in which the lower denture and mandible are retruded, I will endeavor to prove that extraction is absolutely demanded if we aspire to attain to the most perfect result possible. (See Figs. 14 and 16.)

In this division of class II must be placed also one type of that most common of all irregularities, *i.e.* mal-eruption of the upper canines. This is characterized by a decided protruded malocclusion of the upper buccal teeth in relation to a normally posed lower denture, showing that this type belongs to the common inherent type of protruded upper teeth which demand extraction. (See Fig. 1.)

In Dr. Angle's class III, or "mesial malocclusion" as it is termed, there is only one type of the many distinct characters of this class for which extraction is demanded. This type is characterized by a decided protrusion of the lower denture in relation to the mandible, which is accompanied usually by the common retrusion of the upper teeth. The only way in which the deformed facial protrusion of the lower lip can be corrected is by extraction. This type is so rare, however, that it can hardly be counted. (See Fig. 24.)

To sum up the number of cases in which teeth are extracted by all skilled rational orthodontists as compared to the whole number of cases presented for treatment: there arises about one case in thirty or thirty-five in Dr. Angle's class I, and in his class II about one case in every twenty, making, on the whole, only about one case in every twelve or fifteen.

FIG. 1.



But, few as these cases are, this method of treatment should not be ignored by any orthodontist who strives for the highest attainment of his art. Moreover, I will show that this method of treatment pertains to those particular cases which cannot be more than partially corrected without extracting, and which, when corrected in that way, are by all odds the most difficult to retain, with the almost certain probability of ultimately stamping a most unhappy facial deformity for life upon the patients.

The fact, also, that almost every orthodontist after four or five years of experience in practice as a specialist resorts to extraction in the correction of these

cases, however enthusiastic he may have been at first over the unvarying and arbitrary normal occlusion theory, is *prima facie* evidence that this is the true principle of practice the application of which we owe not only to our patients, but to ourselves, in an honest skilful effort to perform the most practical and beneficent service.

Class I.

The fifteen marked cases of bimaxillary protrusion shown in Figs. 2 and 5 have arisen in my practice within the past eleven years; five of these have presented within the last four years, this being their first entry to publication. Notwithstanding the fact that these cases are characterized by a normal occlusion of the buccal teeth, and that in nearly all cases the labial teeth are in comparatively typical relation, the most pronounced of all dento-facial deformities is to be found in this type.

This personal record of the marked cases of this character, however, hardly begins to represent the comparative number of these cases found among the mixed types of the white race. An observing expert at quick diagnosis of facial outlines will see them everywhere, in the cars and crowded thoroughfares of cities, with physiognomies characterized by protruding mouths and receding chins. The reason why these individuals do not seek us more often for correction, though they may be perhaps embarrassingly conscious of their imperfection, is that most of them do not imagine that any correction is possible. Moreover, their dentures are so frequently in normal occlusion that even dentists whose thoughts are engaged in saving teeth, upon seeing these seeming perfect relations, give little thought to the facial effect which the dentures produce; or, if they think of it at all, they regard these patients as more or less exceedingly homely, as God or inheritance made them. The same is true of many modern orthodontists who would not consider for a moment the extraction of teeth from mouths in which the dentures are already so nearly or quite in normal occlusion, and who will doubtless tell you that all that is necessary in these cases is to widen the arches and retrude the front teeth. While this might result in a partial improvement in the facial outlines, the teeth always remain in unpleasant evidence, with an awkward strained management of the lips, and in a very large proportion little or no correction is possible in that way. The pity is, that this condition could often be wholly corrected by a more rational treatment, leaving every power necessary for mastication.

I doubt if this type is recognized by the "new school" orthodontists as belonging among marked "malocclusions," nor does it, in the sense in which that term is employed, because the teeth are so often in normal occlusion, as shown in similar types of negro skulls (one of which is frequently employed to illustrate a typically normal occlusion), and consequently the term malocclusion, when applied to these cases, is somewhat of a misnomer. Yet if there is any type in dental orthopedia which demands extensive correction when it occurs in the white race, it is this.

When these cases present for treatment, especially, as they frequently do, after the eruption of the second molars, with the teeth crowded closely together in arches of nearly or quite normal width, with receding chins, and decidedly protruding lips which are closed with difficulty over the protruding dentures, will

the gentlemen who have been chosen to discuss this paper tell me how they can possibly correct the facial outlines of these patients by an orthopedic movement of the teeth without extraction, and produce anything like the results which I shall show? Will they further explain why in cases of the teeth crowded in jaws that are unquestionably too small

FIG. 2.

to contain them in alignment, filling the jaws more than full from the tuberosities and rami forward, and also having had from the very start of their occlusion all the advantages claimed for the developing activities of a normal occlusion—why in *these* cases the maxilla and associate bones have not been stimulated to that newly found process of "bone-growing" to at least such an appreciable extent as to partially harmonize the relationship of the facial outlines?

From my viewpoint the reasons therefore are as follows: The teeth and jaws, in their inharmonious sizes and relations, have arisen according to the law of heredity, through the union of dissimilar types, or from the propagation of variations; also because it is not an established law of biology—as has been claimed—that the bones can by natural or artificial forces be made to grow larger or longer than their inherent sizes, else this possibility would have come to light long ago in the watchful breeding by artificial selection. I shall have more to say upon this theme later.

The group of cases illustrated in Fig. 2 has been previously published, but I cannot refrain from calling especial attention to two cases of this group, because they are so germane to the subject. In the case shown in Fig. 3, the dentures, with the exception of a slight malposition of the upper right lateral, were almost perfect in occlusion, arch width, and alignment, and notwithstanding that four teeth were extracted as shown, followed by the application of the most

FIG. 3.

FIG. 4.

scientific methods of correction, the dento-facial protrusion is still not wholly reduced. Think what misfortune marred this patient's girlhood because she did not receive proper treatment until after twenty years of age, largely because her occlusion was normal!

of the already protruding lips, with an increase of the receding chin effect? Upon examining the finished faces as they appeared after treatment—one of which is reproduced from a photograph—it appears as if there had been a forward growth of the mandible be-

FIG. 5.

The one case in this group in which the front teeth were in marked mal-alignment is shown in Fig. 4. It will be seen by carefully examining the original facial cast that the upper lip is but slightly protruded, which is explained by a glance at the overlapping malpositions of the upper front teeth contracting the arch. If the front teeth had been placed in arch alignment with a preservation of all the teeth—the buccal teeth being already in normal occlusion—could the result have been any other but a further protrusion

cause of the greater prominence of the chin and the almost perfect dento-facial outlines, but I can aver that this is wholly due to retruding the dento-facial area, made possible by the extraction of the four first bicuspids. Soon after completion of the operation, the young man was graduated from Princeton College, and because of his somewhat phenomenal academic ability and brilliancy, received from the United States government an important diplomatic appointment abroad. As this appointment

necessarily entails exacting social functions and relationships, the difference between the two methods of correction was of the greatest importance to this patient, since treatment without extraction would have left him with a protruding mouth, prominent teeth, and a receding chin, while the result of the other treatment is characterized by comeliness, self-poise, and intellectuality.

sion of the teeth is almost ideally normal, that is, it is more perfect than the normal occlusions that are the most common. But when we compare this occlusion with the physiognomy, is it not strange that competent, earnest men will continue to insist that—"A normal occlusion is incompatible with abnormal facial outlines?" They may also continue to insist —for some time—that such dento-facial

FIG. 6.

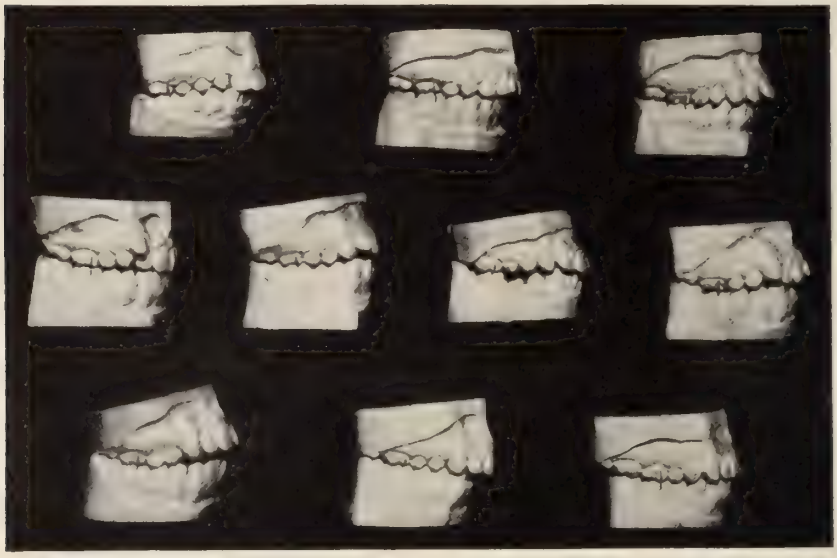


Fig. 5 is another group of bimaxillary protrusions which have been treated in my practice in the last five years. They present the same marked characteristics of physiognomy as the former group. Fig. 6 illustrates the same normal relations of the buccal teeth as shown in Fig. 3.

I wish particularly to call attention to one of these cases, the casts of which were made before I referred it to my college associate for correction. (See Fig. 7.) With the single exception of a slight malposition on the right side, the occlumalrelations arise from local causes, if they acknowledge that they exist at all except as "freaks." But is it not asserted in ethnology that there is an unbroken gradation between different facial types, which includes this very type? Will these men therefore tell me where freaks begin and the natural condition ends?

In regard to the other way of stating this mathematical rule—"Malocclusions are incompatible with normal facial outlines for the individual"—I wish to call your attention briefly to Fig. 8. The face on the left is one of those which

appeared in the first group of bimaxillary protrusions; that on the right has the appearance of a typical bimaxillary retrusion.

Study well the dento-facial outlines of the middle face. Could anything be more perfect, and, were it possible for me to show the young lady as she appeared when this cast was taken, you would say no one could be more beautiful. And yet look at the malocclusion of the dentures, from which many teeth were missing because of extinct germs, and tell me, if you can, that "A full complement of teeth in normal occlusion is absolutely necessary for the most perfect facial outlines!"

While speaking of this phase of the subject I wish you to glance again at the case which Dr. Cryer reported (Fig. 9) and which at the beginning, as shown in the face on the left, had all the characteristics of an excessive bimaxillary protrusion; yet I have no doubt—without, however, having consulted Dr. Cryer—that the buccal teeth were in normal occlusion. The dentures and alveolar processes were removed surgically, followed by the insertion of artificial dentures, which produced a complete restoration to normal facial outlines characterized by the highest type of intellectuality. The face on the left presents the expression of a degenerate, despite the normal occlusion of the teeth, while the face on the right with its mutilated dental arches gives promise of a far more successful and happy life. In the face of such evidence, who can say that it is wrong in other cases to remove teeth pro-

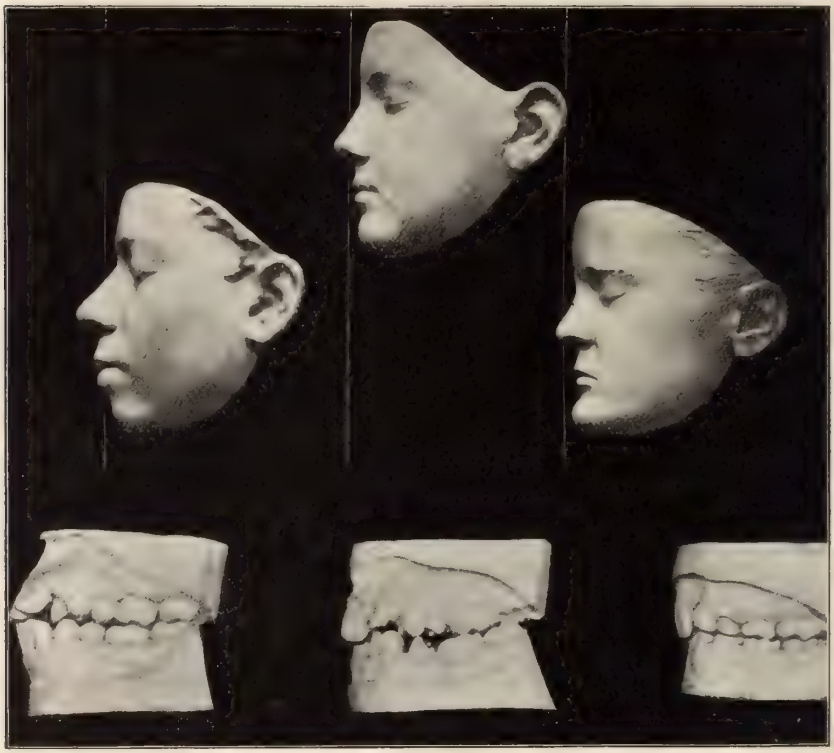
Fig. 7.

ductive of facial deformities which cannot otherwise be corrected and whose absence from the corrected arches is hardly discernible?

I have selected the first three cases from the last group of ten bimaxillary protrusions, in order that we may more accurately observe the facial and dental conditions before and after treatment. In Figs. 10, 11, and 12 the upper, middle, and lower facial and dental casts illustrate respectively the three cases before and after treatment—showing the right and left view of the teeth in occlusion.

I wish to call attention to the middle case of these groups. When the patient presented, at fourteen years of age, I hoped to correct the condition without extraction, as the bimaxillary protrusion at that time was not marked, because of the contracted arches. The teeth were therefore placed in normal occlusion, as shown in the intermediate dental cast. While the protrusion of the dento-facial outlines was considerably increased by this movement, I still hoped that the developing growth would harmonize the relations. But after waiting about one year, and still finding that unhappy protruded expression about the mouth in an otherwise quite perfect face, and wishing to have time to properly correct it before the patient started a course in an eastern seminary, I consulted with her parents and expressed my dissatisfaction with the

FIG. 8.



result. I found that they also were very much dissatisfied, and delighted at my proposition to extract the four first bicuspids. It was at this time that I took the first facial impression from which the cast was made as shown on the left. The pictures of the finished casts, both facial and dental, do not do full justice to the present beauty of the face or the occlusion of the teeth of the patient. Fig. 13 is reproduced from a recent photograph taken about one year after the close of the operation.

In an extensive practice one will be called upon to treat every gradation of bimaxillary protrusion, from the most pronounced to those less severe types, in regard to which a doubt must arise in the minds of those who fully appreciate the conditions, as to what nature will do to harmonize the relations in growth development.

I will illustrate this by the presentation of one of three cases (see Fig. 14) which I am now holding in abeyance for a later period of development, when I shall decide definitely in each case whether I am to extract four bicuspids or not.

When this young lady presented, at about fifteen years of age, the facial outlines were not protruded, as may be seen by the first facial cast, because of the contraction of the arches due to the decided malpositions of the teeth. But as the arches expanded under the force of appliances and the teeth came into alignment, the face gradually assumed the characteristics of bimaxillary protrusion, as shown in the final cast, which was made at sixteen years of age. I was unable to fully establish the normal occlusion before the patient was obliged to leave for her summer vacation.

Her mother expressed great disappointment in regard to the prominence of her daughter's teeth, saying that she had brought her to me because another orthodontist had regulated teeth for her son, and had left them in an even more pro-

FIG. 9.

—*Cryer.*

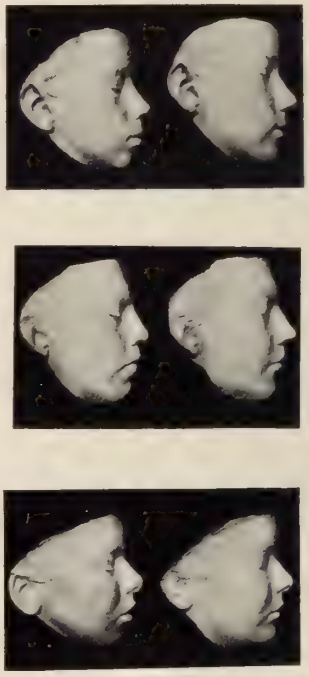
truded state. She also stated that her family was characterized by prominent mouths and teeth, her father, her sisters, and a brother exhibiting these characteristics, which in her own case were less pronounced. I had noticed that her teeth were prominent and quite in evidence when she spoke or laughed. She said she hoped her daughter had escaped, as her mouth was not at all protruded until she commenced having her teeth regulated.

I then explained to her that inasmuch as her daughter was quite small and apparently under-developed for her age, I hoped that continued growth of the facial bones would ultimately harmonize the relations. But I added that if after waiting at least one year I found no promising change for the better, I would then extract four bicuspids and retrude her daughter's front teeth. Instead of objecting to the extracting, as I feared she might, she was greatly pleased, but very much surprised, because she had been told that "no competent orthodontist extracted teeth nowadays." I shall not be greatly disappointed to find that the prominence of the girl's mouth grows worse rather than better, for I have watched a number of cases assuming distinct parental types in the later years of adolescence, which were hardly perceptible at fourteen years of age.

Class II.

Dr. Angle's class II is particularly interesting because it contains types which, like class I, differ from each other almost diametrically in their characteristics and demands for treatment. In about one-half of the cases of this class extraction is demanded for correction, while in the other half it would be the height of malpractice. The principal marked cases of the first division which demand extraction are characterized dento-facially—First, by a decided protrusion of the upper lip, with the lower lip and chin in normal pose, showing that the lower denture and mandible are normal, the malrelation being due solely to a protrusion of the

Fig. 10.

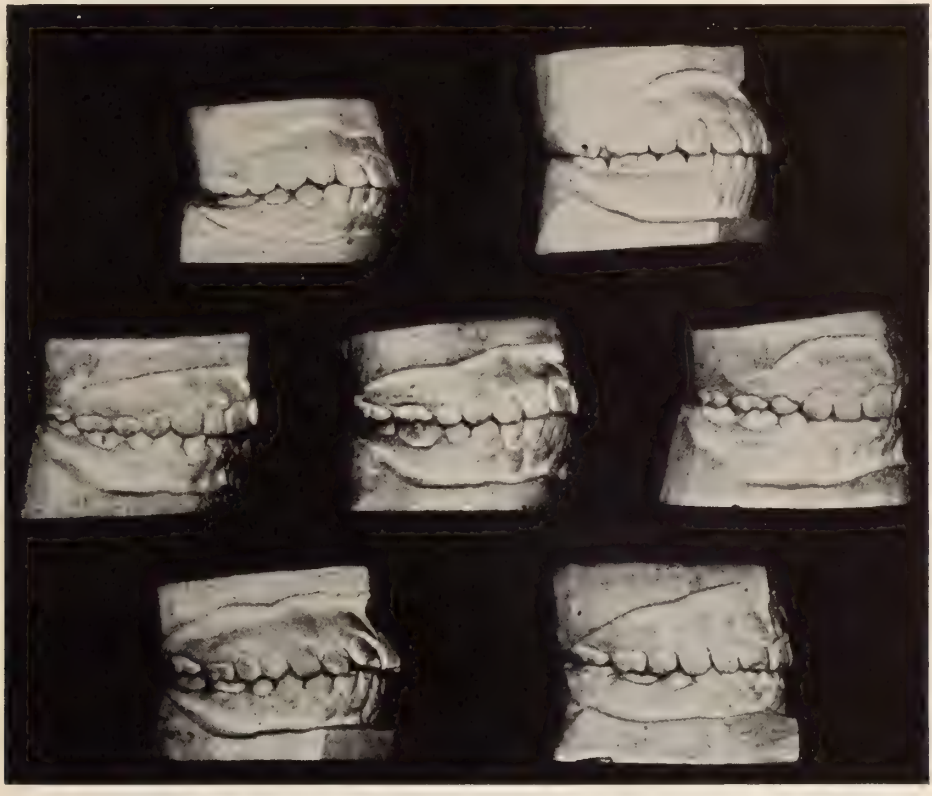


upper denture, which may involve the entire alveolar process and possibly the maxilla (see Figs. 15 and 16). Second, by the upper protrusion being accompanied by a decided lack of prominence of the chin and lower lip, showing that both the mandible and lower denture are in a retruded malposition. (See Fig. 17.) Both of these types and many other disto-mesial malocclusions can often be traced directly to heredity, and there is also every reason to believe

that the forces of atavism are sufficiently strong to carry the results of mixed types from many generations back.

It must be seen that in these cases in which the lower teeth and mandible—indicated by the relation of the lower lip and chin—are in harmony with each

FIG. 11.



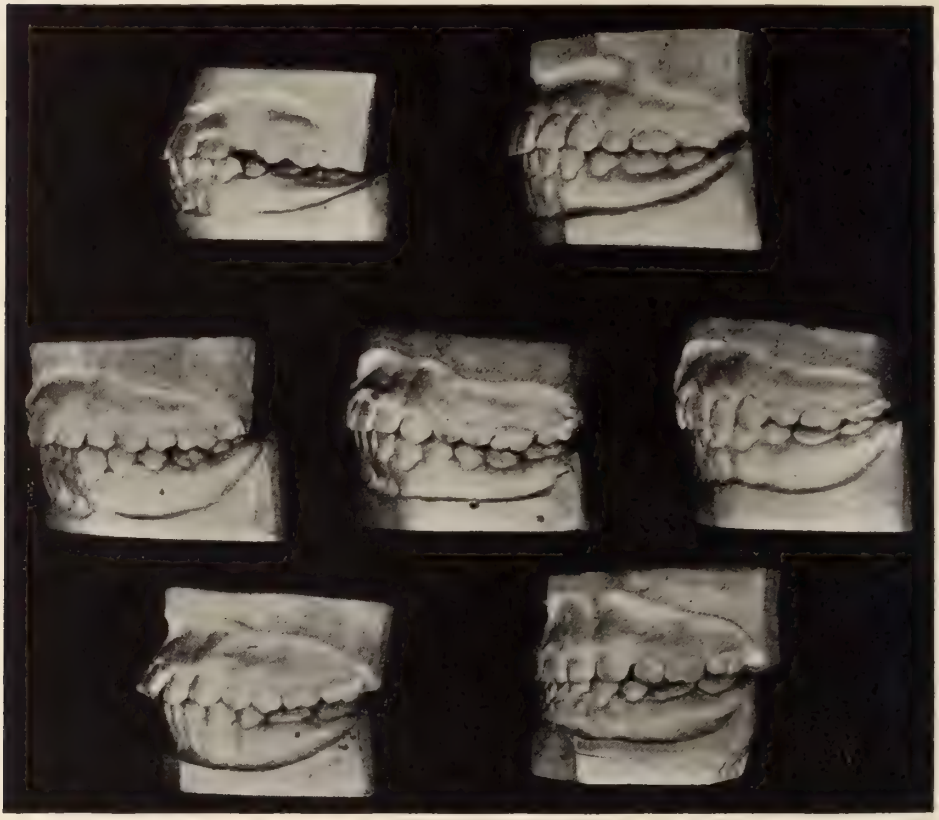
other, and especially in cases where both are retruded dento-facially, any effort to produce a normal occlusion without extraction must necessarily result in a protrusion of the lower lip in relation to the chin, with the upper—in decided protrusions—only partially corrected.

Moreover, I earnestly believe that no matter at what age correction is started in these inherited cases, the ultimate results will be the same. Those who are performing extensive *mesial* movements of the lower teeth for the purpose of placing the first permanent molars in normal occlusion, in following the teaching that "The modern idea of orthodontia is to restore the normal balance of forces during development and allow nature to produce a normally balanced and symmetrical face," will find, according to my judgment, that they have done a far greater wrong to some of their patients than they will like to be responsible for in the future.

If correction is attempted without extraction in the first type (Fig. 15), it should consist in a retrusion of the en-

tire upper denture the full width of a bicuspid, in order to correct the protruded facial outlines. It is practically impossible to accomplish and retain such an extensive backward movement of an entire denture at any age; moreover, this procedure would be decidedly inadvisable even in very young patients, because of the probable encroachment upon the unerupted molars. One may succeed, under very favorable conditions, in moving the upper denture back about half the width of a cusp with the intermaxillary force, which of course means that the lower denture will be moved forward to the same amount. This I believe was Dr. Angle's first proposition for all of his class II cases. In most of the cases, however, where this is attempted with the usual appliances or without special provision, the lower dentures will be moved forward about twice as far as the upper is moved backward. In either case the upper protrusion will be only partially corrected, while the lower denture will be abnormally protruded. In other words, the patient will be left with a bimaxillary protrusion, a receding-chin effect, strained management of the lips with the unpleasant exposure of prominent teeth, and, worst of all, a crowded condition and position of the upper teeth in rela-

FIG. 12.



tion to erupting ones that can rarely be retained at any age.

Fig. 13.

The correctness of the statement that the mandible will grow to a harmonizing size will depend entirely upon whether it has been stunted in normal growth development, which is quite improbable, unless we assume the absurdity that the same cause at the same time produced the over-development of the upper jaw. Malrelations of this character point directly to heredity. The claim and recently repeated inference that the mandible can be made to grow by artificial stimuli *beyond* its inherent size is not in accord with any law of organic development.

In both the types shown in Figs. 15 and 17, the upper first bicuspids are extracted in my practice. The only teeth which require extensive movement thereafter are the six upper front teeth, which are forced back to close the spaces and correct the facial outlines. During this process the buccal teeth are adjusted to an interdigitating occlusion which answers all the demands of mastication, and, what is more, the positions of the teeth are easily retained.

Fig. 14.

In these cases, as in nearly all the illustrations shown, the impressions for the final casts of the dentures were taken

immediately upon removal of the correcting appliances. They consequently

Fig. 15.

Fig. 16.

Fig. 17.

do not show that perfect interdigitation of the buccal cusps which it will be the

tendency of the grinding forces of occlusion to effect. I often wish that operators who are wont to call these results "mutilated cases" could see some of the

FIG. 18.

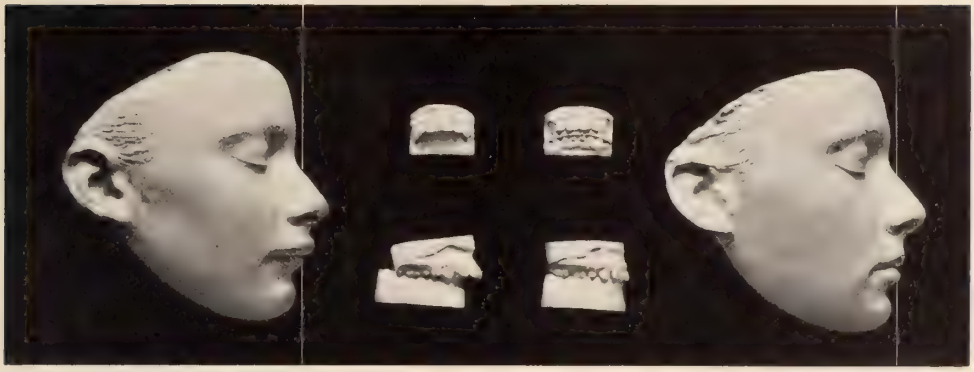


FIG. 19.

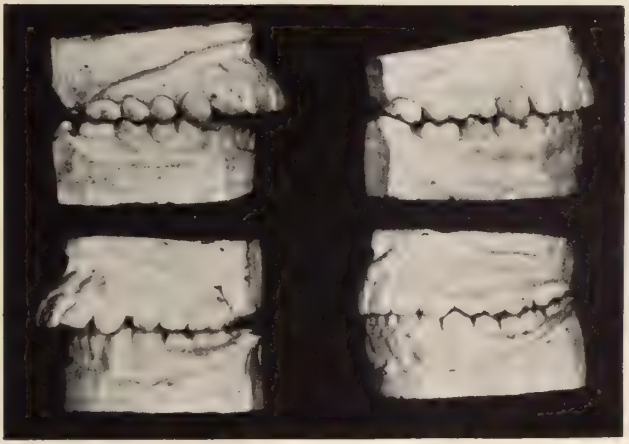


FIG. 20.

FIG. 21.

finished products commonly obtained after extraction, often with little or no movement of the buccal teeth, and largely through a simple retruding movement of the upper front teeth alone.

Before leaving Fig. 15, I wish to call attention to the facial outlines of the middle face after the crowns of the anterior teeth had been retruded, and the improvement that was brought about by a retruding movement of the roots and alveolar process, which is shown in the final appearance of the face.

The next picture (Fig. 18) shows a typical case of decided upper protrusion, which I at first hoped to correct without extraction, because of the spaces originally existing between the anterior teeth and a slight retrusion of the lower denture. But I soon found it necessary to extract the upper first bicuspids, as is my common practice in these cases, in order to correct the excessive protrusion of the upper lip. Fig. 19 shows the right and left views of the teeth at the beginning and close of the operations.

The assurance of perfect retention following this method of operating is far greater than that obtained in other cases of this class which are corrected without extraction. In nearly all of these cases the occlusion grows better rather than worse, with such a perfect interdigitation of the masticating cusps that it requires the closest scrutiny to notice that any teeth are missing. Fig. 20 is made from a photograph of the patient taken about one year after correction. Fig. 21 is reproduced from a photograph taken two years later. Note the similarity in the facial outlines of this picture and the final plaster cast of this patient made three years before.

To illustrate this further, let me call attention to the facial outlines of Fig. 22, which at the beginning of treatment was one of that somewhat rare type of protrusion of the upper portion of the

Fig. 22.

upper lip which usually obliterates the naso-labial depressions and produces a most unhappy facial expression. It is corrected as shown by bodily retruding the roots and surrounding alveolar process of the anterior teeth, which can only be successfully accomplished by extracting the upper first bicuspids.

The photograph of the face was taken five years after the close of the operation. It will be seen that the facial outlines of the profile are a remarkable duplicate of those of the final plaster cast, taking into account the years that elapsed between—which is a fair evidence of retention. For the benefit of those who hesitate in the employment of facial casts, let me say that plaster impressions, if taken skilfully, copy accurately the outlines and contours of the face, the advantage being that they can be viewed for study from every angle.

The peculiar type of facial outlines which characterizes the other half of Dr. Angle's class II, in which no teeth should ever be extracted for correction, is shown in Fig. 23. These are marked types of retruded lower dentures in relation to normally posed mandibles, with the upper teeth normal or but slightly protruded, though exhibiting the same characteristics of malocclusion as the cases of decided upper protrusion. I have noticed that a large proportion of the illustrations which are employed to prove the principle of non-extraction in Dr. Angle's class II are chosen from exactly this type of cases.

In all of these faces will be seen the decided retrusion of the labio-mental area of the lower lip in relation to the chin, with the same distal malocclusion, as it is called, of the lower teeth in relation to the upper, and with very slight protrusion of the upper lip, showing that the lower dentures are placed much too far back in relation to the mandible in comparison to typical relations.

FIG. 23.

I should like to ask those who claim that all malocclusions of the teeth arise from childhood diseases, What kind of disease could possibly cause this malocclusion? It must be one that is sufficient in itself to place and hold the entire lower denture back of its normal position until it starts the distal jumping of the permanent cusps, for up to that moment occlusion can have no influence in forcing them back. Furthermore, is it even a reasonable possibility that such an occlusion, after it commences to act, can carry the entire lower denture back to nearly the full width of a bicuspid in relation to the mandible and upper den-

ture without forcing the upper denture forward materially?

Every operator who has ever tried knows how well-nigh impossible it is to force lower dentures back to any great extent with artificial force, and how comparatively easy it is to move either of the dentures forward.

cases, would not the same mechanical forces of occlusion upon both dentures apply as in the former condition?

It certainly would be malpractice to extract teeth in this class of cases, because quite a decided forward movement of the entire lower denture and a slight retruding movement of the upper one

Fig. 24.

Let us suppose that adenoids have interrupted the forward growth of the mandible with its teeth (if one can conceive of such a condition without a like effect upon the upper jaw), and that after the first permanent molars have become fixed in their mal-interdigitating occlusion the adenoids are removed or disappear, as they usually do at about twelve years of age—now, when the mandible continues its developing growth to the normal size, as we find it in this type of

in bringing the dentures to a normal occlusion can easily and safely be accomplished with the intermaxillary force; and mainly because such a movement is demanded to compensate for the abnormal retrusion of the labio-mental depression and to correct the slight upper protrusion.

Class III.

The one type in Dr. Angle's class III in which extraction is demanded rarely

presents itself in my practice. It consists mainly in a decided protrusion of the lower denture in relation to the mandible, the chin being in normal facial harmony. (See Fig. 24.)

My only object in presenting it at this time is to confirm by it, and by the picture that will follow, in connection with others that I have shown, what I shall have to say in an ethnological treatment of this subject, in regard to there being every possible antero-posterior malrelation in the positions of dentures as regards the jaws in which they are placed, and also in the positions of the jaws to each other and to the balance of the bones which form the physiognomy.

In this case the entire lower denture is decidedly protruded in its relation to a normally posed mandible, and in Fig. 25 the mandible is decidedly protruded in its relation to a normally posed denture. The characteristics of this last case are directly traceable to a family type, the father and one of the sons of the family having the same prognathous mandible. While I am unable to explain the cause in the former case, I believe that every anthropologist will consider it to be of a distinctly atavistic type, arising somewhere from the mixture of dissimilar types or the law of natural variation, which I have every reason to believe should be accepted as one of the causes of malocclusion of the teeth.

FIG. 25.

EXTRACTION CONSIDERED FROM A SCIENTIFIC STANDPOINT.

Thus far I have confined myself to the clinical and common-sense side of the question. The balance of the paper will pertain particularly to the scientific aspects of the subject.

Within the past few years certain prominent writers have repeatedly emphasized the theory that nature's plan in the phys-

ical structure of each individual is an harmonious one; that the form, size, position, and relation of the various parts which go to form the framework of bodies, especially that of the human face, are intended to be in perfect harmony with each other according to the racial type, and that whenever they depart from this, it is always due to some diseased condition which has perverted or interfered with the intended normal development.

I could quote pages of this teaching, which is well stated in the following excerpt: "Let us remember that malocclusion of the teeth is always associated with a lack in the growth of bone, or the perverted growth of bone, in degree corresponding exactly with the degree of malocclusion. Nature attempts to build a denture, a face, a skull, and all other parts of the anatomy to be in accordance throughout with a type she has designed for the individual; but for some reason, some of her processes in the building of the different parts may have been interfered with. The result, as we find it, is perversion or arrest in the growth of the alveolar process, jaws, and associate bones, and malocclusion." *

These writers do not admit, and they even go so far as to ridicule by absurd and false examples, the possibility that heredity has had anything to do in the inharmonies which arise in the sizes and malrelations of the teeth and jaws, or any of the other bones of the skull. In fact, they deny that such inharmonies exist in the natural or normal state—in other words, that the union of dissimilar types produces in the offspring inharmonies in the sizes, etc., of bones which are so closely related as the teeth and jaws and associate bones.

It is further asserted as a very strong probability in young people, that whenever the mandible, for instance, is found to be of a size insufficient for perfect facial harmony, before or after orthodontic operations, the stimulating effect of the operation and subsequent normal occlusion will result in an interstitial growth of this and other bones of the head which may be lacking in size; one writer claiming that this possibility of bone-growing through the influence of artificial stimuli is based upon biological law, and therefore will obtain whether the comparative smallness of the bones is of the inherited sizes or not.

All of these theoretical propositions, if true, would tend to prove that no teeth should ever be extracted in the correction of malocclusions; and this, moreover, seems to be the main reason for the repeated efforts on the part of the school that is advocating this principle to foist upon this profession these theories, which as a matter of fact have no scientific basis whatever.

THE LAWS OF HEREDITY AND VARIATION.

I therefore may be excused for dwelling at some length upon the well-established evidences of ethnology, with a glance at the laws upon which the science of biology is founded, though in a paper of this character so great a subject can be treated in no more than a cursory manner.

There is no doubt in the minds of advanced anthropologists that the form, structure, and relation of the bones of the human skull, like those of other bones of the body, were evolved from a being very much lower in the animal scale, through the unwavering laws of heredity, variation, natural selection, and influences of environment. And that the species homo, through segregation in distantly located parts of the globe presenting marked differences of environments,

* Angle, *Cosmos*, March 1910.

became through slight variations during many ages the different races of peoples, characterized by distinct types in color, hair, and physical framework of physiognomies, etc.

While there are only three markedly distinct races—the white or Caucasian, the yellow or mongoloid, and the black or negroid—through admixtures by intertribal relations and more distant migrations, many quite distinct races have been formed, with the production of intervening types, which are said to blend into each other with imperceptible gradations.

This is a subject which pertains to the established sciences of stomatology and ethnology—branches of anthropology—which are today taught in our colleges, and which are founded upon many years of patient, careful investigations by the most learned scientific minds.

It is shown that the present white race, more than any of the others, is decidedly a mixed race, there being few if any left of the original representatives of the Caucasian type, to which we are accustomed to refer as the standard of beauty and physical perfection. Yet because of the fact that our tastes and appreciation of these qualities are being varied under the same adaptive guiding forces of evolution which have characterized the physical, we not uncommonly meet with types which fully accord with our own understanding of manly beauty and perfection, which I presume was also true of the Hottentots, before their land was visited by a higher race.

What interests us most as orthodontists, especially if we essay the correction or improvement of facial beauty that is marred or deformed by malpositions and malrelations of the teeth and jaws, is the fact that in our own America, above all other localities, the union of dissimilar types occurs most frequently. Furthermore, the laws of heredity, throughout the whole line of biological development in flora or fauna, do not necessarily produce in the offspring a blended composite type. In fact, such an occurrence from parents of dissimilar types is far more rare than otherwise. The offspring from fertilization in dissimilar types of both plants and animals often exhibits an association of distinct physical characters that obtain in both parents or their progenitors, as the forces of atavism may be carried through many generations. A slight observation of physiognomies must fully demonstrate the inheritance of inharmonious characteristics—"For nature knows no laws of esthetics, as beautiful and harmonious as her products are."

This has been fully recognized by both Darwin and Wallace in the earlier researches of evolution. Huxley, more than thirty years ago, in writing upon the laws of heredity and variation, said: "It is a matter of perfectly common experience that the tendency on the part of the offspring always is to reproduce the forms of the parents; that is a matter of ordinary and familiar observation. In all cases of propagation and perpetuation there seems to be a tendency in the offspring to take the characters of the parental organisms. Nor do you find that the male follows the precise type of the male parent, nor does the female always inherit the precise characteristics of the mother —there is always a proportion of the female characters in the male offspring, and of the male characters in the female offspring. There are all sorts of intermixtures, and intermediate conditions between the two of dissimilar types, when complexion, beauty, or fifty other different peculiarities belonging to either side of the house are reproduced in other members of the same family. You will

also see a child in a family who is not like either its father or mother, but some old person who knew its grandmother, or it may be an uncle, or perhaps a more distant relative, will see a great similarity between the child and some of these." Much could be written and quoted along this line, but time will not permit.

With a moderate understanding of the ethnological principles of biological development, with our minds free and untrammeled by preconceived ideas and tendencies to follow a leader even into unscientific paths, I should like to speak of the art side of our specialty, which directly relates to the question of extraction.

Notwithstanding the fact that all the recent text-books and papers that have emanated from the "new school" of orthodontia taboo and even ridicule the claims that heredity is one of the causes of malocclusion, I believe the time is not far distant when a broadened understanding of associate sciences will correct this error, and when all men who are striving for the common good of humanity will work hand in hand as brothers, co-operating in this great field of our specialty, which presents such abundant opportunity for the display of science, art, and mechanics.

The present phase of my subject pertains to that which we find exemplified everywhere about us—first, to the relationship as regards size, form, and position of the maxillary bones proper to the balance of the bones which form the framework of physiognomies; second, to the relations of the dental and the alveolar arches to the true bones of the maxillæ—both with a view of comparing that which we commonly find with that harmony of relation produced by the most perfect facial effect which accords with our present standard of beauty; third, it pertains to the question of abandoning true facial art for set rules of practice along lines drawn mechanically and mathematically which are claimed to be applicable for every case.

I believe it is quite generally conceded that all forms of animal life about us are the offspring of progenitors whose physical and mental characteristics they repeat to a very large extent, either by direct inheritance with the blending of types, or with the association of the distinct characters of one or both parents or, through atavism, of more distant progenitors. The law of variation, about the forces of which little is known, is always and everywhere in action through the metabolic activities of the germ cells, with the production of slight transmissible modifications, though occasionally with unaccountable spontaneous variations.

It will be seen that the types, within each class of species, present the most marked differences in the form and size of the bones which constitute the framework of bodies. Thus we have tall and short men, either one of which may possess strong, heavily built bones or slender and delicate ones; nor does esthetic harmony nor the typically anatomical prevail, except rarely, with each individual. Moreover, it is common to find inharmonies in the sizes and relations of bones which are closely associated, as the bones of the face, and which can frequently be traced to direct inheritance or the admixture of inharmonious types.

In this investigation, which anyone with an observing mind may pursue, there will be found to exist every possible variation between the so-called freaks and those of Apollo-like harmony and perfection. If these types could be collected

and placed side by side, they would blend into each other with imperceptible gradations; just as we find noses of every possible shape in relation to harmony with the features upon which they are placed, and jaws prognathous and retruded in relation to the balance of the features. This must be equally true of the sizes of teeth whose width measurements we are told should be employed to determine the sizes of the newly regulated dental arches. If the sizes of dental arches are made in exact mathematical proportion to the width of the upper central incisors, will not these arches be found at times too large or too small for facial harmony, and to an extent that is noticeably deforming? We frequently find the sizes of the front teeth quite out of proportion with the features. Moreover, the width measurements of the right and left centrals are rarely alike, and commonly vary under *normal* conditions 1/64 of an inch, and at times even more.

Many of the facial inharmonies pertain to the dental and maxillary framework, and characterize the physiognomies as plain, homely, or deformed, according to the character and amount of the protrusions or retrusions over the dento-facial and mandibular area, and whose beautifying correction should be one of the highest aims of the dental orthopedist.

In many protrusions, both unimaxillary and bimaxillary, the entire bodies of the maxillæ, or at least the portions which support the alveolar processes, are protruded in their dento-facial relations, which is easily determined by the prominence of the chin and the prominence at the base of the nose and along the upper portion of the upper lip. In many of these cases the teeth are in perfect harmony of size and position with the protruded jaws, in arch width, alignment, and inclination, and yet distinctly out of balance with the esthetic relations of the features. Moreover, in bimaxillary malpositions the teeth are often found, as I have shown, in typical occlusion in the white as well as in colored races, because both dentures are equally protruded. Again, in a large proportion of protrusions, the protrusion pertains mostly or wholly to the dental and alveolar arches alone.

Thus every malposition in dental and dento-facial relations may be found, which points directly to the law of heredity as a cause for many malocclusions of the teeth, and not to the narrow view that God does not make such mistakes in forming the human anatomies of physiognomies, except in "freaks."

A prominent author of a recent work on biology and a member of the faculty of Columbia University, to whom I submitted the biological portion of my paper for criticism, writes me as follows: "I have indicated by notes in the manuscript my impressions of the topics discussed, and feel myself entirely in sympathy with your point of view. A statement like 'Nature never puts teeth into a mouth that do not belong to that physiognomy' always arouses my ire. Variation is so thoroughly the rule in nature, not only in individuals but in *parts* of individuals, that there is just as apt to be disharmony as harmony. Of course, in so far as the race is concerned, inharmonies which render the individual unfit for environment or unattractive as a mate will be weeded out, but the same variations will occur again and again in individuals. I suppose your opponents would hold that bone and teeth, coming from the same elementary tissues, would carry the same inheritance, but observations show

this to be untrue. And obviously it is untrue in relation to the bones of the head."

PRACTICAL CONSIDERATIONS.

In two cases presented by me at the anniversary meeting of the First District Dental Society of New York city, in 1907, shown in Figs. 24 and 25 in the preceding section of this paper, the mandible of one was decidedly protruded, with the crowns of the lower denture in normal dento-facial relations, the front teeth being lingually inclined, while in the other case the mandible was in normal dento-facial relations, with the crowns and occlusal ends of the denture decidedly protruded, the front teeth being labially inclined.

Moreover, in nearly all typical protrusions of the dentures not due to local causes the teeth are crowded closely together, showing that the buccal teeth partake of the protruded malposition quite as much as the labial teeth.

This brings us to a point which I wish to emphasize, because it pertains to the question of early correction, and particularly to the teaching of shifting the deciduous buccal teeth and recently erupted first molars to normal, in all cases of disto-mesial malocclusion, even though the buccal cups are in full mal-interdigitation. I wish it to be understood that I am heartily in accord with this movement, at whatever age where it is distinctly seen to be demanded. The cases that demand it are, first, those which arise from local causes and which otherwise would be in normal relations; and second, from whatever cause, if one denture or the other is retruded in its dento-facial relations, and the other is not so protruded but that the slight distal movement possible will ultimately correct the protruded facial outlines.

If it is other than this, or if it is a case which it is very liable to be when one denture is destined to be normal and the opposing denture through heredity is decidedly protruded, the operator can rest assured that treatment of this kind, *at whatever age,* will ultimately result in a bimaxillary protrusion, marring the beauty of the face through adult life; nor am I so sure that it is possible to tell what the real conditions are, at this very early age when the bones are just beginning to take on the inherent stamp of their progenitors.

In the hundreds of cases which have come under my observation during the ages of childhood and youth, there is no room to spare in the jaws, especially in protruded cases, back of the deciduous molars, except at the time preparatory to the eruption of the first molars, and finally the second and then the third molars; the latter being often obliged to occupy quite as crowded positions as are seen when teeth are not protruded. In other words, in all cases of typical protrusion in the white race due to heredity, the natural position of the back teeth in relation to the jaws allows for no more than a very moderate distal movement that does not encroach upon space demanded for the succeeding molars, a demand which nature will at one time or another insist upon, or else make trouble.

Therefore in all threatened inherent protrusions, if the molars are moved distally in early childhood to a degree sufficient to correct the protrusion without extraction—which is not at all probable, even if possible—one may count quite surely upon ultimate disaster. It may be claimed here that, inasmuch as the great-

est forward growth of the jaw during these ages occurs back of the deciduous denture, by crowding the molars back nature will be forced to make the jaw grow larger to meet the demand.

In discussing a paper read recently before a prominent society upon the advantages of radiographs in orthodontia, a prominent teacher in a dental college—who evidently had caught the "bone-growing" fever—criticized Dr. Cryer's warning in regard to the excessive distal movement of molars, upon the bare evidence of a single case that was shown, in which a third molar that evidently had been impacted by a distal movement of a second molar had finally erupted to normal position. This speaker also expressed in unmistakable terms his belief that the crowding of the teeth and the artificially applied forces will stimulate the interstitial growth and elongation of the jaw-bone itself, and thus carry all the denture forward and give plenty of room for the third molars. This is abundantly proved to be untrue by the many instances of crowded dentures that are protruded in relation to the jaws in which they are placed; if it were possible for this crowding stress of the teeth to create a greater than the inherent size of a mandible, for instance, one would not so frequently see retruded chins. The single case shown may have been one in which the distal movement was not great, and the mandible destined by heredity to be sufficiently large for all the teeth. Besides, if the speaker who presented these radiographs will make pictures of unerupted third molars which finally come into normal positions, he will find them occasionally in exactly the position shown.

If nature possessed this power in the individual, or if it were possible for us to stimulate nature to an extra-interstitial growth, which the critic and many others seem anxious to proclaim, there would be far more harmonious relation between the sizes of dentures and jaws than is seen to exist. We would not see those frequent, marked cases of bimaxillary protrusions which are not usually noticeable until ten or twelve years of age, and which seem to increase in prominence during adolescence.

In my opinion, the jaw-bones proper—and especially the mandible, which is not subjected to the same influences as retard the development of the upper jaw—assume the forms and sizes determined by the unchangeable laws of heredity under healthy growth conditions in the same way as other bones of the body. While the rapidity of their early growth may be hastened, while inhibited developments may be stimulated to normal growth, and while the forms of the bones may be varied slightly by bending, I doubt if it has ever been authentically proved that natural or artificial forces have made them grow interstitially longer than their inherent normal size.

As I have mentioned elsewhere, what really takes place in the artificial production of normal occlusion in these cases is that the opposing denture is moved forward far more than the protruded denture is moved backward. In the many cases of inherited upper protrusions, for instance, where the lower denture is in normal dento-facial relations, the ultimate unhappy result which is left to stamp itself upon the future physiognomy is a bimaxillary protrusion, with a probable receding-chin effect.

I know what the opposing answer to this contention will be, *i.e.* that there is no such thing as an inherited protrusion of the teeth. To this I will reply, before-

hand: Then there is no such thing as prognathous mandibles—which may be seen everywhere! Furthermore, my opponents' statement is a denial of the established evidences of ethnology.

It would be far more advisable, in my opinion, in those cases of marked distomesial malocclusion of the buccal teeth which are not distinctly due to local causes or to retrusions of one denture or the other, to wait for a more mature development of the facial outlines, which would enable a sure and correct diagnosis of the conditions, and then treat the case along the lines of art and within the realms of physiologic demands.

"BONE-GROWING."

The theory entitled "bone-growing," which has recently sprung into the limelight and has been so enthusiastically grasped by many who seem to see in it a means for obviating one of the greatest difficulties of correcting malocclusions without extraction, is, in its true and legitimate sense, an old and well-established principle in orthopedic surgery, and which now is given a new name and clothed with added powers based upon no clinical evidence or scientific data.

This theory briefly stated is: The stimulating effects of orthodontic movements of the teeth, and the healthful activities of a normal occlusion will cause the jaws and associate bones to grow to the harmonizing sizes of the dentures. In other words, in those cases of decided upper protrusion, for instance, in which the lower denture and lower lip are in anatomical and esthetic relations to the lower jaw and chin, when corrected without extraction and the lower denture is forced forward considerably farther than the upper is retruded, as is common with ordinary methods—leaving a protruding mouth and a receding chin effect—that if this operation is performed during childhood or youth there will ultimately arise a growth of the bones sufficient to harmonize the facial relations.

As it has been asserted that this possibility is in accord with biological law, it may be well to glance at some of the principles of biological development and methods of artificial cultivation, to see if we can find the semblance of a law that should lead to a belief that the true bones of individuals can be stimulated by mechanical force to grow beyond their inherent sizes, or the sizes which they would naturally assume under favorable conditions.

Biology and biologists deal only with the natural laws of organic evolution. By long patient and scientific investigation, biologists verify every proposition over and over again before it is stated as a scientific truth. These pertain principally to the problems of life, heredity, natural selection, variation, and influences of environment. Moreover, the truth of these laws is further abundantly verified by artificial selection in the cultivation of plant and animal types.

To state briefly: The law of heredity is so strong that everything in life would exactly duplicate itself in form and structure were it not for the unceasing law of natural variation. Furthermore, the forms that are endowed with natural variations would all become extinct under the strong forces of atavistic heredity, so that there would be no science of biology or organic evolution were it not for the law of natural selection induced by differences of environment.

It may be well to state that the law of natural variation, fulfilled in both natural and artificial selection, has no ref-

erence in biology to perceptible physical changes in structure that arise or that may be produced in individuals from local causes or from artificial stimuli. Such events have little or nothing to do with biology proper, because that kind of variation is not transmissible, except when the cause and its results obtain through many generations so as to finally become a natural variation.

Moreover, such physical changes of a permanent nature in the individual, other than those which arise in resuming interrupted growth and the development of functional activities, are never of a normal structural character in animal life, and certainly never result in healthy interstitial growth of bones to the extent of carrying their development to a larger than their inherent size or form. I am making this assertion advisedly, basing it on opinions which I have recently obtained from some of the most advanced authors and teachers of biology, and which hardly accord with the opinion stated to me personally by an ardent believer is this recent propaganda of bone-growing. When I said to him: "If this is true, we could make all small men grow taller," he replied, "I presume we could, if we knew how to apply the right kind of mechanical force."

The *natural* variation with which the science of biology deals arises during the metabolic activities of the fertilized germ cells in both plants and animals, of which there are many interesting theories that fill volumes.

Again, Darwin's law of natural selection is not, as is usually supposed, the selection of mates through instincts and qualities of the individual or sexual selection, but it is that which was intelligently stated by Huxley when he invented the term "survival of the fittest"—in other words, nature's selection of those who are capable of thriving and procreating their kind amid the environments presented.

In the struggle of life, the influences of environments are exerted very strongly upon each individual toward the production of adaptive qualities and forms, to render them more fitted. Whole libraries have been written upon this phase of biology alone, but in all these volumes adaptive variations induced to arise in the individual after birth are rarely considered as factors in biological development, and certainly one finds nothing in regard to the possibility of producing adaptive or harmonizing changes in the physical framework of animals after birth by mechanical or any other stimuli, because biologists are engaged with the problems of *natural* reproduction and development. Furthermore, I doubt if such accomplishments are possible after one-third of the period between infancy and adult life has elapsed, or at the age when children naturally fall into the hands of orthodontists, and certainly not at the eruptive age of the third molars —which was enthusiastically proclaimed probable by the teacher whom I have quoted.

Such variations in the individual are seen at times in plants whose roots and limbs reach out after moisture and sunlight, but rarely if ever in animal life, except perhaps in superficial tissues, with no effect upon the framework or skeleton except in instances of inhibition resulting in diminished growth. What does occur, and through the forces of which all the various forms of life and species have sprung, an offspring appears, among the many, with a *natural* variation, perhaps induced in fertility by the stimulation of needs which surround the parents, resulting usually in slight changes in form or

structure, and yet sufficient to make life easier and more vigorous, and capable of reproduction, and so on, with increased or other adaptive variations *always inherent in the offspring*—the higher adaptive qualities crowding out the weaker.

The framework of the neck of the animal which started to become a giraffe did not grow by increasing the individual lengths of its seven cervical vertebræ under the stimulating strain of need to reach higher for its food. What did occur? A favorable variation arose in this particular in some offspring, which rendered it better fitted to the environment, etc., until, through many generations of reproductions of favorable variations, the present giraffe resulted. Thus it has been with everything everywhere throughout the past ages in the developmental processes toward surrounding us with untold variety of living things. When one begins to comprehend the wonderful co-ordination and interdependence of the forces of heredity, variation, natural selection, and environment, a far deeper veneration and love arises within him for the great Prime Mover of all things.

Man steps in with his artificial selective facilities and hastens the operation —that is all. He does not change or add to it one single biological law. He first selects large quantities of the species he desires to breed, and then, by cross-mating or hybridizing, through segregation, foods, and environments, with special scientific methods, he observes in the reproduction of their offspring the mixed, blended, or distinctive types. From these he again selects and segregates the desired types, and again and again breeds, until the special types are fixed. From these forces have arisen nearly all the domestic varieties of flowers, fruits, pigeons, animal strains, etc., which beautify and add pleasure and profit to our lives.

CONCLUSIONS.

I have gone into this subject at considerable length, in order to show the presumption of any man or set of teachers, who are not biologists in the true sense, proclaiming new theories and laws relative to nature's secret laboratories of organic evolution, without basing them upon any scientific verification in clinical experience or original investigation—theories that are thought out over night and boldly stated in the morning, because they would be fine if they were true, and would help to establish other theories that would be fine if true. The said theory postulates that bone may be formed in the individual in response to mechanical stimuli that are in no essential way different from forces exerted by regulating appliances. This statement does not apply alone to the alveolar process, whose inherent function is to follow and surround the teeth wherever they move or are moved, nor is it confined to the stimulation of undeveloped bone. It refers to true bone—the mandible, if you please, which even if destined to be smaller in the unwavering stamp of heredity than the esthetic requirements of the protruding teeth—which these operators cannot help but deformingly protrude in their efforts to place them in normal occlusion—then nature, by some occult forces undiscovered by biologists, will cause the mandible to grow larger, and also all the other bones of the skull that are not in harmonizing relations to these artificially protruded teeth.

It is freely admitted and frequently verified that bones whose natural develop-

ment has been inhibited by disease may be stimulated to a revivification of normal growth; also that the physiologic development of true bones may be quickened by artificial stimuli to a more rapid growth toward the normal adult sizes, but I doubt if it will ever be possible to cause the true bones of an individual to grow larger or longer than the sizes which are stamped upon them by the laws of heredity, however strong our desires may be for bone-growing to help us out of our difficulties. I believe I am fully sustained in this view not only by biological processes but by ethnological evidences, which are abundantly confirmed by the conditions prevailing everywhere about us.

Furthermore, I wish to repeat that this whole question of so-called bone-growing, when confined within its true legitimate realm, is nothing more nor less than the stimulation of dormant or inhibited physiologic activities, pertaining to renewed growth and development of bones, a principle which has long been recognized as one of the common possibilities of orthopedic surgery. The propagandists are giving this principle a differently sounding name, and are speeding it on its way under a new and florid phraseology, claiming that it is in accordance with the laws of evolution, and is one of the laws of biology, whereas it has nothing more to do with the principles of evolution and the laws of biology, as I have endeavored to show, than any of the other well-known physiologic principles of growth. When these propagandists attempt to go beyond these principles they are entering an unknown field of biology, where modesty should be the watchword until their theories have been abundantly proved by reliable data.

Discussion.

Dr. M. H. Cryer, Philadelphia, Pa. It gives me much pleasure to have had the opportunity of hearing Dr. Case's paper, as I consider the essayist to be a man who thinks before he acts, and one who studies his cases in all their phases. He lays down no dogmatic rule to fit all patients, and is willing to listen to and accept facts from those who may differ with him. The only fault I can find with the paper is that it contains but few vulnerable points for me to attack.

In looking for some point, however, on which I might find an excuse to differ with him, I find the following: "Never extract a tooth for the purpose of making the operation easier." Suppose the patient to be a weak, delicate, and nervous child, perhaps with chorea or epilepsy, in whom the irregularities of the teeth and the nervous condition were brought about by the same causes either before or after birth, and in whom it was found that the mechanical appliances, though ever so nicely adjusted, increased the nervous condition, interfering with proper rest, mastication, digestion, etc., would it not be better to make an exception in a case of that kind, if the operation could be made easier for the patient by extraction of a tooth?

Dr. Case disagrees with those in the dental profession who claim that irregularities of the teeth are invariably due to causes operating after birth, as well as with those who believe that malpositions of all classes, including impaction, can be avoided by preventive methods. I also cannot agree with these writers. I would much rather take a firm stand that all irregularities and malpositions of teeth, barring those produced by accident, are

the result of causes operating before conception. I fear that those who claim that all causes of irregularities of the teeth are post-natal have not read, much less studied the laws relating to heredity and breeding. The investigations and writings of Mendel, Darwin, Weismann, DeVries, Burbank, and others teach us that all variations except those resulting from accident are governed by the laws of inheritance. In order to show how fixed this matter is in my mind I would like to bring to your notice my personal experience with reference to laws of heredity and breeding by careful selection in my younger days, and the application of these laws to my own specialty, which has made me a firm believer in these facts. My achievements in this respect in winning prizes in the city of Cleveland alone would confirm the accepted laws of heredity. The following are some of the prizes won by animals owned by me and bred according to the above-mentioned laws: In 1856, Ohio State Fair, saddle horse "Hassan;" in 1862, Ohio State Fair, best thoroughbred stallion and best stallion of any age or breed, "Bronx;" in 1871, Northern Poultry Association, best collection of game fowls and pigeons; in 1872, Northern Ohio State Fair, best boar of any age or breed; in 1891, best kennel of pug dogs. Incidentally, I may say that if I were to exhibit today in Cleveland, I would show pedigree roses that had been bred according to the laws of Mendel, and would expect to win over those not so hybridized.

It is by application of these laws that new varieties of plants and animals are produced. The American trotter is one of the best examples of modern breeding. By a study of the forms and temperaments of the fastest trotters, selections have been made with good results. The first products were found to be lacking in stamina, so the blood of the thoroughbred was introduced. In selecting the thoroughbred horses, the peculiar forms belonging to what might be termed natural trotters were used as far as possible. As the thoroughbred horse has a natural tendency to the running motion when going fast, many of the trotters produced by this system of breeding had certain irregularities of motion that in some cases caused them to "interfere," *i.e.* to cut themselves when the feet were passing each other in this artificial action. The orthopedic surgeon of the trotting horse was frequently called in and used various appliances, such as bands, cords, toe-weights, etc., to the legs and feet, on principles similar to those used by the orthodontist in applying bands and wires to correct irregularities of the teeth. But the scientist was determined to overcome these defects, and by scientific means of breeding and following the laws of heredity, horses have been produced that can do their work with a clean and free movement without mechanical appliances for the correction of irregularities. Were conditions suitable, man could do as much for the human mouth. The orthodontists who believe that all irregularities of the teeth are of post-natal origin will never accomplish this any more than the stay- or splint-maker will produce children with straight bodies and legs. He can only correct the defects of the individual, just as the horse-jockey corrected the interference or irregularity of the individual trotter. Unfortunately, the breeding of the human family is but slightly under the control of any laws governing selection for reproduction. Where it has been under control, marked results have been obtained.

I wish to throw upon the screen a few pictures of animals that have been bred according to the laws of heredity. Fig. 1 shows a pig which won first prize as the best white hog at a Royal Agricultural Show in England; Fig. 2 is a picture of a hog which won the first prize at a show of the same society one hundred years later. These two pictures are intended to show what a study of the laws of heredity and breeding will do in a hundred years. It was with a descendant of the second animal that I won the first prize in Cleveland in 1872.

Fig. 3 depicts a greyhound, a dog that has been bred for hundreds of years for the express purpose of coursing the hare, in which no other dog can compete with him. The pedigrees of these dogs are more carefully kept in England than the records of the sales of land. This dog is bred for endurance and fast work, with quick-turning attributes and with jaws that can take hold of his game, while he can breathe through the mouth at the same time.

Fig. 4 is a bulldog, which forms a contrast in nearly every respect to the greyhound.

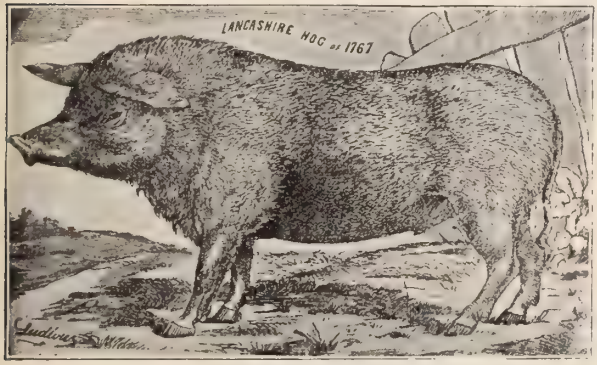
Fig. 5 is a side view of the skull of the greyhound, with a fair occlusion of the teeth in the position which his breeders consider the best form for the purpose intended.

Fig. 6 is a side view of the skull of a bulldog, bred for the peculiar fancy of irregularity of the jaws and teeth. I do not know in what class Dr. Case would place this irregularity, or whether he would advise Angle's appliances, Baker's anchorages, or Jackson's cribs for its correction. Each of these animals was bred by the laws of inheritance for special purposes, *i.e.* the shape, attributes, and irregularities of the jaws and teeth were *prenatal* in origin.

Dr. Case presented two slides in one of which the lower anterior teeth are shown to be lingually inclined, while in the other they are labially inclined. I wish to take the liberty of showing similar conditions.

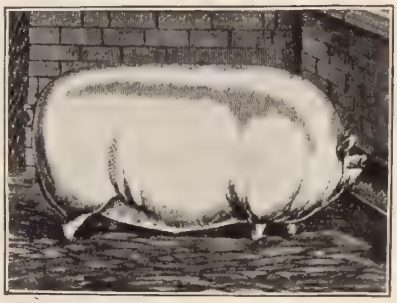
Fig. 7 shows two lower jaws; the one below, B, is of a white person and is almost typical, with the teeth in the position normal for this character of skull, and the occluding line about correct for that age. The relations of the body and

Fig. 1.



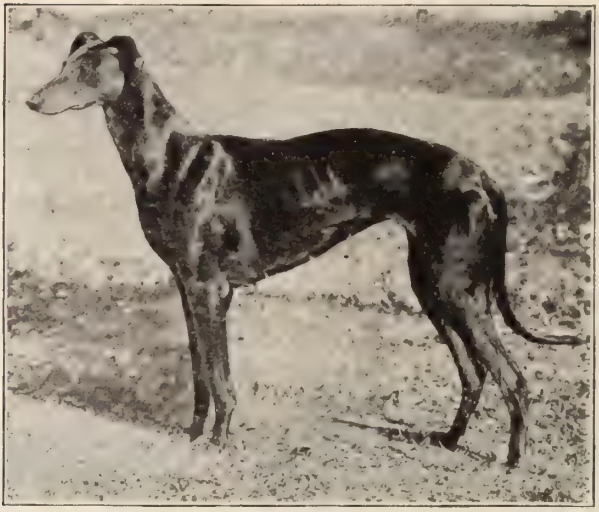
Lancashire hog. Prize-winner, 1767.

Fig. 2.



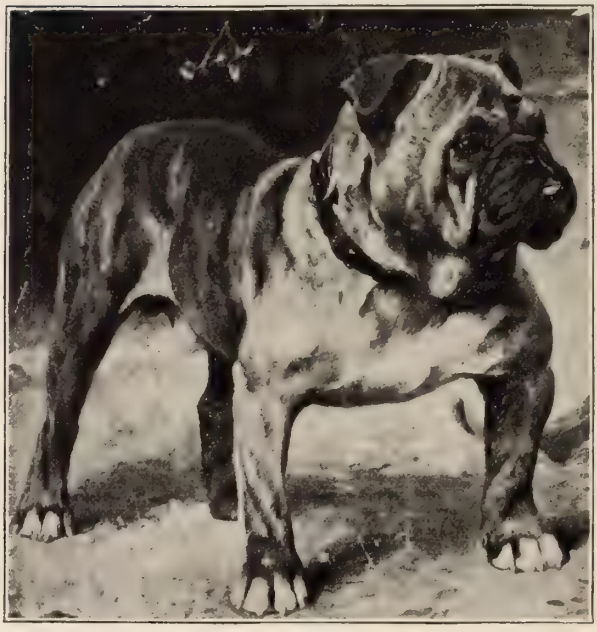
Lancashire hog. First prize, 1867.

FIG. 3.



Greyhound.

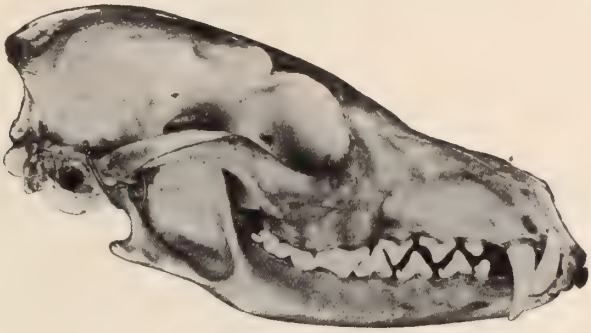
FIG. 4.



Bulldog.

ramus are good, forming about a right angle. The third molar is somewhat hidden behind the anterior border of the ramus. The mental foramen is about midway between the lower border of the jaw and the top of the alveolar process, and between the roots of the first and second premolars. Anterior to this there is a good chin or mental process, with the front teeth in harmonious position. The mandible above, A in the picture (Fig. 7),

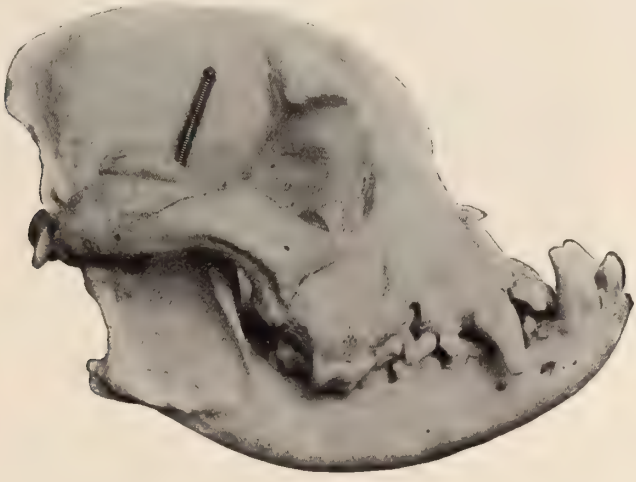
FIG. 5.



Skull of greyhound.

is from a West African negro; the ramus and body in this case are in almost the same relation as in the other jaw, forming nearly a right angle, but along the upper border anterior to the ramus there is quite a difference. The teeth are advanced in the jaw by the width of a molar. The mental foramen, rather a fixed point antero-posteriorly, is under the first molar instead of being on a line between the roots of the premolars. The lower

FIG. 6.



Skull of bulldog.

portion of the mental process is about normal, producing an harmonious facial outline, but its upper portion or alveolar process is carried forward along with the anterior teeth, which have labial inclination. In this negro jaw all the teeth have not interfered with mechanically or through misalliance, causes the upper and lower teeth to find their proper positions for good mastication. In the picture before you (Fig. 8) the maxilla proper is placed well forward in the cra-

FIG. 7.

A

B

Two mandibles. A, From an adult of the Fan tribe, of West Africa. B, From an adult Caucasian.

been carried forward by the full width of a molar, and it is more than likely that the cause of this formation has been in operation since prehistoric times. Let us articulate this jaw with the rest of the skull (Fig. 8) and we will have a normal occlusion, barring, perhaps, the incisors. There is a great natural law which, when nium, the distance between the free edge of the hard palate and the foramen magnum being a full centimeter greater than in the average skull, so that the teeth are not carried forward by extension of the alveolar process alone, but the whole jaw is also forward. The true mandible is not much out of shape, but the teeth in

hunting for their antagonists, or bite, have carried the alveolar process and the cancellated tissue forward, on the same principle as the dentist carries teeth forward by mechanical means, the alveolar process following, but the true bone does not advance in either case.

or without slanting forward or producing a labial inclination of the lower incisors. The point of the chin is slightly prominent, with the teeth lingually inclined, just the reverse of the last picture. A plaster cast of these teeth and alveolar processes would convey no idea of how

FIG. 8.

African (see A, Fig. 7).

Fig. 9.

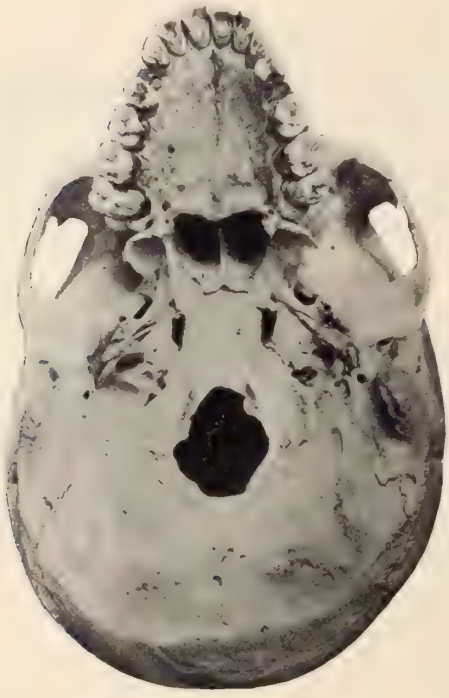
Of mixed breed.

Fig. 9 is taken from a person of mixed breed. Unfortunately, "pernicious extraction" or decay has broken up this arch. This is a case where the maxillæ are carried well forward by a long basilar process. The lower ends of the pterygoid processes are also far forward; in fact, the whole upper jaw is advanced by about the width of a molar, and the alveolar process is advanced as well as the jaw proper. The anterior teeth have just about found good occlusion without giving the appearance of receding chin this occlusion was brought about, but a careful digital examination of the mandible or a good X-ray picture would show that instead of the normal right angle, this mandible has a very obtuse angle, throwing the body of the jaw and the line of the teeth forward, so far forward in fact as to necessitate a lingual inclination of the anterior teeth. As these prognathous jaws are not in harmony with the Caucasian characteristics of the rest of the skull, much argument could be introduced as to the proper mode of

treatment to produce in this patient a better facial alignment. It is unfortunate that there cannot be brought about a resorption of tissue that is not required, or a building up of new bone where it is lacking, to make more pleasing features.

Fig. 10 is a picture of the under surface of Fig. 9. It shows how far forward

Fig. 10.



Under surface of skull shown in Fig. 9.

the jaw is placed, and the great distance between the anterior border of the foramen magnum and the free edge of the hard palate and cutting edge of the incisors. The latter measurement is 11 cm., which is within 7 mm. of that of the most prognathous skull I have, shown in Fig. 8. The distance horizontally from the anterior margin of the foramen magnum to the vertical plane of the most posterior point of the skull is 9.5 cm., being shorter than in many Caucasian skulls. These measurements, to my mind, show that the anterior portion of this particular skull is very similar to the prognathous skulls of West Africa, and the posterior portion is much like that of the Caucasian skull of Europe.

Dr. Case has stated that new bone cannot be induced to grow beyond its inherent size. I believe, at the present time at least, that he is right; what I may think tomorrow is another question—it will depend to a certain extent on what is meant by new bone. If new bone can be induced to grow, I would like to know the nature of the growth, whether it is hypertrophic in character, as in the patient shown by Dr. Case in the three pictures on one slide, or whether it is hyperplastic or neoplastic. I have seen several enlargements of bone—I do not speak of the alveolar process—following the endeavor to correct irregularities of teeth, that were hyperplastic in character. One of these terminated fatally, and the others recovered after removal of a large section of bone. I feel like cautioning anyone against starting a neoplasm, for when it has once been started it is very difficult to control the new growth.

Fig. 11 gives side views of two skulls. The one on the left, A, is that of an adult about twenty-five years of age, having a full set of normally occluding teeth. The picture on the right, B, is from a person of seventy-five years or more, all the teeth having been lost and the alveolar process resorbed long before death. A comparison of these two skulls gives a good idea of how much more important the alveolar process is than the true bone in building out the lips and face in that region.

Fig. 12 shows the under side of these

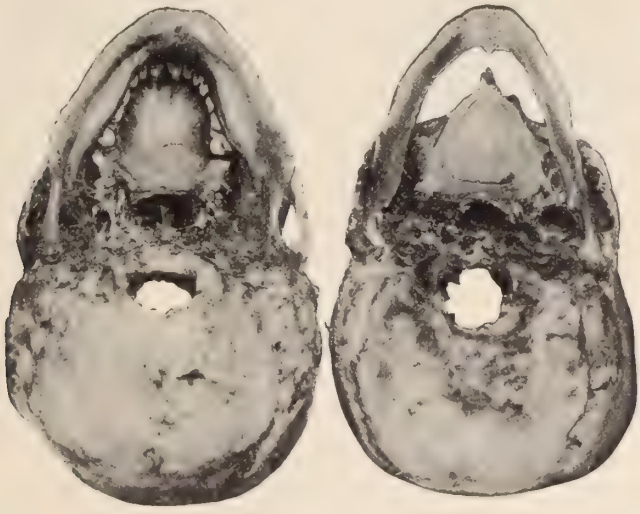
same skulls, that on the right indicating about the true size of the upper jaw proper, while that on the left shows a jaw of about the same size plus the teeth and alveolar process, which comes and goes with the teeth. If we look at the roof of the mouth in the pictures on the left, we see the bone formed by the palatal processes of the maxilla and the horizontal processes of the palate bones. It is the suture through the center of this roof that some of the orthodontists and rhinologists claim they can open by applying a force to the superstructure

FIG. 11.

A B

Side view of two adult skulls. A, From a subject about twenty-five years old. B, From one well advanced in years.

FIG. 12.



A B

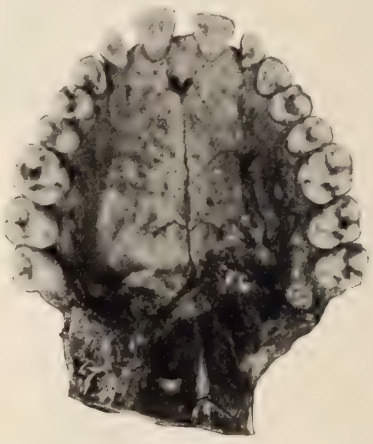
Under view of the two skulls shown in Fig. 11.

which is temporarily fixed upon it. A writer in the July issue of the *Dental Cosmos* says that the space produced between the bones is afterward filled with cartilage or new bone. I have been unable so far to obtain proof that the suture has been opened and filled with new bone. The supporters of this theory have given several reasons for their belief, but I fear these would not be accepted by a jury composed of anatomists, physiologists, and pathologists.

Fig. 13.

Showing wide separation between incisors.

Fig. 14.



Under surface of maxilla shown in Fig. 13.

One of the proofs that these men offer to show that the suture in the roof of the mouth has been opened is that by expanding the arch the space between the central incisors can be increased. The teeth are set up in comparatively soft bone, with its interlacing fibers; these, however, do not cross the median line from one side to the other, so some separation of the process may take place at this central line, but it does not extend to the true suture between the maxillæ proper.

I am of the opinion that when the dentist applies sufficient force to move the teeth, they will advance in the direction of least resistance, and owing to this constant pressure of the tooth against the process, the latter breaks down and becomes resorbed and the space made by the advancing teeth will be filled with new bone of the *alveolar* process. I do not believe that the whole process is carried out *en masse,* as one would push out the wall of a house, consequently the suture cannot be opened by this method of spreading the arch.

Fig. 13 shows a wide separation between the incisors in the median line, and also some separation between the centrals and laterals and canines. Has a force been applied to the teeth which has carried them out to form a larger arc of a circle? And if so, has the intermaxillary suture been opened and the floor of the nasal cavity widened? If this is the case, it might be well to ask of those who

believe that the above is correct, a practical question at this point: If this jaw is so wide as to be unsightly, can a force be applied to the teeth to narrow the arch? In so doing would not the palatal arch be compressed and the floor of the nose narrowed and the nasal septum deflected? It is generally stated by those who claim that they can widen the nose that a wide arch is nearly always accompanied by a wide floor of the nose. But the specimen before you and the numerous other skulls that I have examined tend to show that the opposite is the rule, *i.e.* a wide arch is often associated with a narrow nasal floor and a narrow arch with a wide nasal floor. I do not believe there has been any mechanical force applied to these teeth (Fig. 13) which brought about the wide arch and separation of the anterior teeth, but I am firmly convinced that the cause of this condition originated before conception of the individual to whom the jaw belonged, through operation of the laws governing inheritance and breeding;—you may say, if you like, that the small teeth were derived from one side of the family and the large jaw from the other. Let us turn this jaw over and look at the palatal surface, and see how much the intermaxillary suture has been opened.

FIG. 15.

X-ray picture showing impacted molars.

In Fig. 14 you will see that the suture has not been opened one particle.

Fig. 15 is used at the request of Dr. Case. It is made from an X-ray picture

of a patient about twenty-four years of age. It shows three impacted upper molars on the left side. The first molar has a portion of the occluding surface uncovered by bone; the second is well covered, while the third is far up in the posterior wall of the maxillary sinus, with its masticating surface resting against the posterior portion of the second molar.

In the lower jaw the first and third molars were impacted, but were extracted before the picture was taken. There are also impactions on the right side of the jaws.

This patient has two brothers and three sisters. The two brothers and two of the sisters have impacted teeth; the third sister has not been seen by the writer. As there are so many impacted teeth in the family, one might naturally ask if either of their parents had impacted teeth. They had not. The teeth of the parents were in early adult life in fairly good positions, their sizes about corresponding to the individual. But here is a point worth considering: The mother was a fine, small individual, weighing about ninety pounds and under five feet in height, the father just the opposite, large, over six feet in height, and weighing over two hundred pounds. I will leave you to judge this as you like, and will only say that, from the standpoint of a breeder of domestic animals for exhibition, such a combination would be considered as injudicious "crossing."

Dr. Martin Dewey, Kansas City, Mo. From the title of the essayist's voluminous paper one would expect that the subject could be disposed of in a very short time, but after listening to the essay one wonders whether it is on the question of extraction or on personal views of art; whether the essayist intended to speak on the inheritance of family types and of malocclusion, or on the development of the jaws both from an embryological standpoint and the point of mechanical stimulation; whether he wished to discuss the question of early regulation, or of waiting until the case was as bad as it could possibly become; and lastly, whether the paper is a presentation of scientific facts or an attack on the teaching of someone else. Whatever the essay is, may be, or was intended to represent, the necessity of discussion lies not in the fact that I hope to convince the essayist or my predecessor in the discussion, but that certain statements have been made which I do not think to be true. Science is cruel, nature is cruel, and when one advances as broad and as positive statements, at as great length, as have been made today, he must bring good proof, or expect someone to differ with him. My remarks will therefore be not in the nature of an attack, as I was accused of last night, but of direct replies to the teachings which have been laid down in the paper and discussion.

First, the essayist has criticized the teachings of the new school of orthodontia in regard to the early regulation of teeth. He leaves the impression that it would be a great deal better to wait until the patient was older before beginning regulation. His claims for such an assumption are not clearly stated, but he refers to the fact that a great many people have regular teeth, and that these have not been regulated. At the present time I do not believe that there are very many people whose teeth do not need regulating. Even admitting that there is a greater number of normal occlusions than I believe really exist, there is no reason to believe that irregularities existed in those teeth when the patient was young. I would like to know by what

untold process or force teeth that are overlapping and crowded can ever become straight without aid. Every observer has seen cases of extreme malocclusion which had their beginning in one rotated lower incisor. Furthermore, it has never been noted that any such case assumed a normal occlusion. We recognize certain forces which we term "forces of occlusion" that are necessary in order that a perfect denture may develop, and one of these forces is the normal approximal contact point. Without a normal approximal contact point, which we do not find in young children when the teeth are crowded or rotated, a normal occlusion is an impossibility.

In listening to the essay it seemed to me that some of the statements made would have been omitted had there been a proper understanding of the forces of occlusion and of normal occlusion as a whole. For instance, there seems to be a certain question in the essayist's mind as to whether Dr. Angle's classification is the proper one. The essayist consented to use it only because it had been so universally adopted. Why was it universally adopted? Because it is based on normal occlusion, which should be the basis of dentistry. Still, in referring to class I cases, the essayist spoke of the buccal teeth being in normal occlusion, which leads me to believe that he has a poor understanding of this classification or of normal occlusion. In class I cases the "buccal teeth" are very seldom in normal occlusion, which fact would cause a different interpretation of some of the cases spoken of today.

A great amount of time was consumed in discussing the question of inheritance, particularly in trying to prove that malocclusions which were the result of inheritance could not be treated without extraction. No biological facts were stated which would prove to me that malocclusions could be inherited or produced by mixing of types. I now want to call to your minds how inconsistent the essayist is in his paper. He tries to prove that cases are the result of inheritance or inherent tendencies, and that such cases cannot be successfully treated without extraction. In another portion of the paper, however, he describes a case which he claims to be the direct result of inheritance, and which he would treat without extraction. I would therefore like to inquire why, if it is possible to treat one case, claimed to be the result of inheritance, without extraction, it is not possible to so treat the others? I am greatly confused on that point.

Several years ago there was a great amount of discussion as to the question of the inheritance of acquired characteristics. These discussions were participated in by men who could be placed in two classes, namely, those who based their arguments on what they thought they saw, and those who by investigation and research furnished proofs, regardless of their possible effect on former theories.

The question of inheritance is one about which the public has fixed ideas. Does not the Bible state that the sins of the parents will be visited upon the children? Many have thought that syphilis was one of the sins referred to, but now, it having been proved that syphilis is not inherited at all, contrary to the opinions still held by some, but that it is the direct result of an organism, therefore we find another pet theory exploded. But a short time ago tuberculosis was thought to be inherited; now it is proved that it is never inherited, and furthermore, that the tendency is not inherited—unless

living in an infected house be the result of inheritance. I only cite these facts to show how greatly opinions have changed of late years on the question of inheritance. We formerly thought that mental characteristics were inherited, and if a minister's son became a bank robber, he was a black sheep, and if a pickpocket's son became a respected citizen, it was a special dispensation of Providence. It has been proved that both these unexpected results are the outcome of environment for which parentage or inheritance are not responsible. As to environment, it has been shown in this city and at this meeting that the mental disposition of the child is not the result of inherited characteristics, but of a carious tooth.

By inheritance we understand that the offspring will resemble the species. A chicken-egg will produce a chicken and a duck-egg a duck. The offspring may resemble one or both parents, a fact which the essayist and Dr. Cryer seem to have misinterpreted and applied to the production of malocclusions. It is a well-established fact that only those characteristics which are impressed upon the germ cell can be inherited. Nature cares little for the individual, but looks after the species. Variations are constantly arising, and those which arise suddenly are transmitted, providing they are beneficial to the species. If they are not, those of the species which possess them will be lost in the race of life. Malocclusions which are acquired do not arise suddenly, and are not transmitted, because there has never been a logical explanation given of how they could be impressed on the germ cell, thus eliminating a large number of conditions.

The issue at present, according to the paper to which we have listened, seems to be that by the intermarriage of different races or types malocclusions are produced. Dr. Cryer seems to hold a similar opinion, according to his discussion. There is a great amount of evidence in regard to what occurs in the breeding of lower animals, but we do not find any such conditions occurring, as some would have us believe, that could cause malocclusions to be inherited. In the breeding of different types we find the offspring may resemble one of the parents to the exclusion of the other. As a result of this, biologists speak of a predominating and a latent type. Some species have greater predominating characteristics than others. One example is the Hereford cattle. The offspring always resembles the Hereford, and does not revert as in some other cases. In crossing the black and the white races, each of the characteristics will be present. If the crossing is continued farther with the white race, we will reach a point where the offspring will resemble a full-blood white, but unfortunately, in the next generation the offspring may have decided characteristics of the black race. The characteristics, therefore, that are predominating in one generation may become latent in the next, only to re-occur in the following. If this is true, you may ask, why could that not account for malocclusion? Dr. Cryer thinks it can and to prove the wonderful influence of heredity he cites the improvement in the hog, showing a prizewinner of long ago and one of a more modern time. But there is another side to this question, namely, the influence of environment and careful selection. If the prizewinner were forced to fight for existence, as his ancestors did, he would not last long, and the offspring in a few generations would resemble the wild hog from which

he originally came. The wonderful effect of inheritance would give way to the effect of environment. The converts to the wonderful influence of inheritance as a causative factor of all sorts of ridiculous things, malocclusion especially, also like to refer to the record of the American trotter, which again has been produced as a result of careful selection. It may surprise you to learn that the full brothers of the champion trotters often spend their lives pulling a dray-wagon. One colt may be developed into a prize-winner and the other into a dub. Thus inheritance in the racehorse accounts for not more than 50 per cent. of the result; the rest is careful training or environment. Do we not see one boy of a family develop into a great athlete, while his brothers are not able to "flag a bread-wagon?" Therefore I claim that the record of the racehorse proves nothing except what careful training and selection may do. Leave the training out, and in a few years the horse will be where he started from.

Dr. Cryer also likes to cite the bulldog, which is another example of careful selection aided by pathological conditions which develop early in life. Every prize-winning, short-nosed, pug-faced bulldog is a mouth-breather. It is a fact that conditions which arise suddenly may be transmitted, and the bulldog is a result thereof. He is deformed in several parts of his body, and in the struggle for existence would not last for any length of time. The deformity of the face caused him to be a mouth-breather, and mouth-breathing aids in the development of a type of malocclusion that is found in people with similar pathological conditions. Again, the prizewinner is often the direct result of mechanical interference in the development of the face. A great many breeders place pressure on the region of the nose of young puppies, the maxillæ thereby being prevented from developing, and by exerting a forward pressure on the mandible, it is caused to over-develop. Furthermore, that type is very poorly established, for if the prizewinner, male or female, breeds with any other type, the bulldog type is lost in the first generation.

In speaking of the mixing of races or types, I must call your attention to the skull of an individual of white and black mixture shown by Dr. Cryer. The excessive protrusion which was exhibited in this illustration, Dr. Cryer claims to be the result of the inheritance of the jaws of the black on the cranium of the white parent. If the posterior portion of the skull had been shown, I have little doubt that just as great a protrusion would have been noted in the region of the occipital bone as there was in front. In other words, that skull was a type of its own. Moreover, the teeth were in positions of decided malocclusion, which would cause abnormal development of the bones of the face. Again, the skull showed every evidence of rickets, which would cause abnormal development. Therefore I think Dr. Cryer misinterpreted what he really saw.

How would it be possible for the child to inherit the jaws of the black race and the cranium of the white ancestor? After the union of male and female microzoöns, during the process of segmentation and afterward, the cells which develop are the result of the fertilization of the female cells. No cells can be said to be black cells or white cells. Each set of cells possesses characteristics of each parent. If that be true—and I believe Dr. Cryer will admit it to be—how could there be a development of the jaws that

would be distinctly black, and of a cranium that would be distinctly white. It is a further fact in the development of the embryo that a portion of the jaws is developed from the outgrowth of the cranium. I refer to the fronto-nasal process. From an embryological standpoint, therefore, the condition which Dr. Cryer thinks he has found is an impossibility.

This brings us to the consideration of conditions which were mentioned by the essayist. We were led to believe that in some cases the mandible possessed the characteristics of one parent and that the maxillæ were derived from the other. The under-developed mandibles which we find in class II, division 1, are such conditions as the essayist referred to in his paper; also, class III might be caused from the inheritance of a large mandible in a cranium and maxilla obtained from a smaller parent. Dr. Case evidently thinks that he has seen such conditions, according to the arguments advanced in his paper. He does not tell us by what process of development such inharmonious conditions can be caused, therefore I am not ready to believe that they ever do occur. Again, I believe certain investigators have been mistaken, as they were in times past when they thought that tuberculosis was inherited. Clinical facts unproved by other findings are given little weight in this day and age of the world, even when stated by the best men of the profession. Again, from an embryological point, it is impossible for a child to inherit the mandible of one parent and the jaws of the other. The first evidence we have of the beginning development of the jaws is when the branchial arches begin to form. In the region of the neck near the end of the fore-gut we first notice a ridge in the mesoderm on the right and left sides. At this same period an active growth occurs in the region of the cranium, which results in an outgrowth from that region known as the fronto-nasal bud. From the first branchial arch, which has also increased rapidly, a bud is then developed on the superior surface, and at this time it is convenient to speak of the first branchial arch as the mandibular arch. The bud on the superior surface of the mandibular arch is what later develops into the maxilla. The mandible and maxilla, therefore, are both derived from the same source. The premaxillaries are derived from the fronto-nasal bud, but they make up but a small part of the upper arch as compared to the maxilla proper. How, then, can the child inherit the mandible of one parent and the maxilla of the other?

The child may resemble either one or the other of the parents or be a blending of both, partaking of the characteristics of both. If it did partake of the characteristics of both, every part of the structure would be harmoniously constructed. We would not expect to see the right ear of one parent and the left ear of the other. Did you ever see the hand of the father on the arm of the mother? In the study of hybrids we do not find any such conditions as some men claim to have noted in their patients. The mule partakes of the characteristics of both ancestors, but does not develop the legs of the horse and the body of the ass. Neither does he have the hind legs of the horse and the front legs of the ass. Still, in the face of all these facts, we are constantly hearing false statements such as we have heard today.

In speaking of the inheritance of large teeth in small arches, I will be as brief as possible. If large teeth are inherited in small arches, why do we not find an

equal number of small teeth in large arches? If such conditions are inherited, why do they not make their appearance in the deciduous teeth? We never have any such cases presented until after the permanent teeth are erupting and the child has been influenced by acquired conditions and environment for a number of years. Again, in the study of the development of the teeth and jaws, we find that the same kind of cells that enter into the formation of the arch also form the tooth, with the exception of the enamel. In the mesoblastic tissue from which the teeth and jaws are developed, it cannot be determined which cells will form the teeth and which ones will form the jaws. A type of tooth is designed to suit a jaw of certain size, and unless some acquired cause arise, barring congenital defects, normal occlusion will be established. If a child were put together like an automobile, nature might get the parts mixed up, but fortunately the individual develops as the result of the union of two germ cells which blend and form an harmonious type.

Dr. Case refers to cases which we know as class II, divisions 1 and 2, and says that he cannot comprehend why, if adenoids and mouth-breathing are responsible for one form of irregularity, we would note such a difference in the other —or words to that effect. I may not have quoted him correctly, but judging from his arguments that seems to be one point of contention. He also says that he does not see how it would be possible in cases of mouth-breathing that the lower teeth be held distally and such an under-development of the mandible be produced without the upper teeth and maxilla being developed forward. First, I wish to state that mouth-breathing is only one of the evils that are present in those cases. It is long-continued mouth-breathing with its concomitant evils that produces irregularities of class II, division 1, with the narrow upper arch, protruding upper incisors, distal relation of the lower teeth, and under-developed mandible. Those conditions are produced because certain forces of occlusion are disturbed. In cases of class II, division 2, there is a distal relation of the lower teeth, but the mandible is developed because forces of occlusion are normal in this case that are abnormal in the former. On this one question alone a paper could be written which would even be longer than the one we have listened to.

In the treatment of cases of classes II and III Dr. Case admits that teeth can be moved distally. A few years ago he would not admit that. Possibly in a few more years he will admit that malocclusions are not inherited. However, he raises the old contention that in the movement of teeth distally, the teeth distal to the ones that are being moved will be impacted, referring to impaction of second and third molars. Dr. Cryer a few years ago raised that question, and since that time several hundred molars have been moved distally and no impactions have resulted. If a case of impaction should result, it would prove nothing, for we know that hundreds of impacted molars are observed every year in patients whose teeth have never been regulated. Furthermore, as Dr. Case stated, one X ray was made after the teeth were moved distally, and the seemingly impacted tooth came into proper occlusion. Such evidence should prove something, yet to Dr. Case it proves nothing,

As to the question of bone growth, upon which the essayist has written so many pages, he sees fit to doubt the state-

ment that bone develops as the result of mechanical stimulation. He says that there are no conclusive biological proofs therefor, while in reality all of the biological facts go to prove it. If bone does not develop as the result of mechanical stimulation, how does it develop? What has been responsible for the formation of the exo-skeleton and the endo-skeleton except mechanical stimulation? In the study of the development of animals, from the single-cell animal with no skeleton or osseous structure, to the multicellular animal with complicated structure, we find evidence of mechanical stimulation throughout; also in the development of the multi-cusped tooth from the single-cusped tooth, mechanical stimulation resulting from use has been at work throughout. The development of the bone supporting the teeth has been brought about as a result of mechanical stimulation through the use of the tooth. If force which is the result of natural conditions causes the development of bone, it is logical to expect that artificial force properly applied will produce the same effect. We have found this to be the case. Every day arches are being developed as the result of mechanical force, mandibles are being induced to grow, and results are being accomplished that would be impossible without the growth of bone. Dr. Case practically admits that if bone can be made to grow, extraction would not be necessary, and in the practice of a large number of practitioners it is not necessary. Much evidence could be produced proving that bone develops as the result of mechanical stimulation, and I note that Dr. Cryer has played safe by saying that he may change his mind later on, and I know he will, and I hope the same of Dr. Case.

Dr. HINMAN. I would like to ask Dr. Dewey what he does in bimaxillary protrusions. Dr. Case showed us his manner of procedure.

Dr. DEWEY. As I said before, certain features of this paper have appeared to me as a joke. Bimaxillary protrusions are a joke. Dr. Case has set up a standard of beauty, and beauty is something that cannot be defined. The standards of beauty are different according to type. In the negro race the "bimaxillary" protrusions exist, and are normal for that type. There are different types of races, as there are different types of dogs. One might as well say that the greyhound has bimaxillary protrusion because he is not like the bulldog, as to say that the negro has bimaxillary protrusion because he is not like the white man.

Dr. HINMAN. I want to know how you would regulate a case of apparent bimaxillary protrusion. Would you extract?

Dr. DEWEY. No, I would not. In the cases which the essayist has exhibited as representing bimaxillary protrusion, he has unfortunately shown only the profile and not the front view. But he has made the statement that the buccal teeth were in normal occlusion. They were not, however, in normal occlusion in the model that was passed around. Furthermore, the normal mesio-distal locking of the molars is not sufficient to establish normal occlusion of the molars. In the majority of cases of class I we do not have normal occlusion. Furthermore, in those cases in which Dr. Case extracted the bicuspid, he has moved the molars forward. He will contend that he has not, but if you examine the models carefully you will see that the teeth have been moved forward, and in bringing forward these teeth the lower teeth have been "pushed" forward by the stimulation of the growth in the mandible.

Dr. H. C. Ferris, New York, N. Y. It is evident from the import of Dr. Case's paper that a defense of his theory which he has taught and practiced for a number of years is necessary.

It is science, for the good of humanity, that brings us here. Therefore, while I hold the essayist in high esteem and fully recognize his ability and sincerity,

Fig. 1.

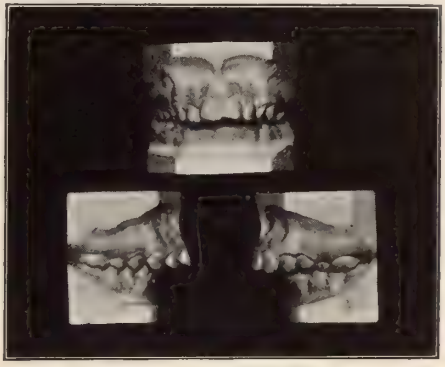
for scientific reasons I do not believe in the principle which he emphasizes in his paper.

His standard undoubtedly is the facial line, according to his idea of beauty, for which there is no rule, except in his own mind's eye. If we could develop our cases into the Apollo type as a standard, with the upper lip at an angle of 45° to the nose, the result would not be pleasing, as many of these faces would be out of balance with the whole head.

Careful observation will prove that nature does do all that Dr. Case says it does not do. It harmonizes all the anatomical parts, even to the color of the hair and the teeth, as well as their form in all types.

We appreciate that a blue artificial tooth in the mouth of a patient of bilious temperament or a brunette with bleached hair is detected at first glance; likewise a tooth with the length predominating over the breadth in the mouth of a patient of nervous temperament is immediately declared artificial by the laity.

Fig. 2.



These illustrations simply portray how harmonious are the properties in the development of any type, and the lesson to be derived is that nature is the best judge, provided we assist her when she is hampered, or when her developmental forces are operating adversely.

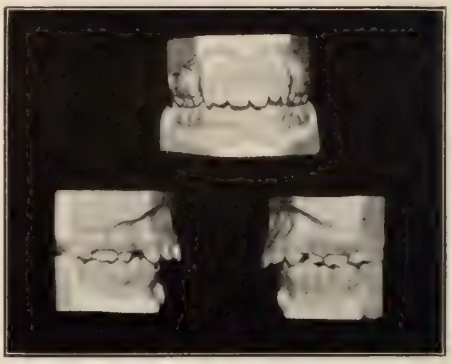
To illustrate this point, one cannot imagine anything more ridiculous than the correction of one of the extreme types as illustrated by the portrait of Savonarola. If, after the principles expressed by Dr. Case, one were to try to convert this type to a given standard of beauty and bring the chin forward to the Apollo type, the resultant artistic injury is

readily seen; or if an upper premolar on one side were extracted, what looks

Fig. 3.

to Dr. Case like a double protrusion at sixteen years of age would result in a depression of the lips, and would throw the features out of harmony with the whole head at maturity.

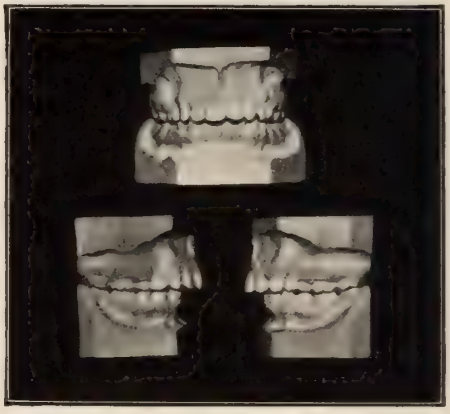
Fig. 4.



Dr. Case acknowledges that Dr. E. H. Angle's classification has been accepted by the majority, which would appear to be a verdict against his recommendations. I have lived long enough to have practiced the essayist's methods of extracting

Fig. 5.

Fig. 6.



the first premolars in cases of class II, division 1, and to see these patients grow to maturity. Likewise I have treated cases of the same class upon the principles set forth by Dr. Edward H. Angle's teachings. I have had the uncomfortable experience of having to undo a case

started after Dr. Case's method, and having to introduce artificial teeth to fill the space that had partially closed, and would court the opportunity to operate on many others in a like manner. In the following illustrations such a case is demonstrated.

Fig. 1 represents a mask picture of the case, taken by flashlight.

Fig. 2 shows the original model. Fig. 3 is a picture of a plaster mask taken after one year's treatment after Dr. Case's method. Fig. 4 shows the model after one year's treatment.

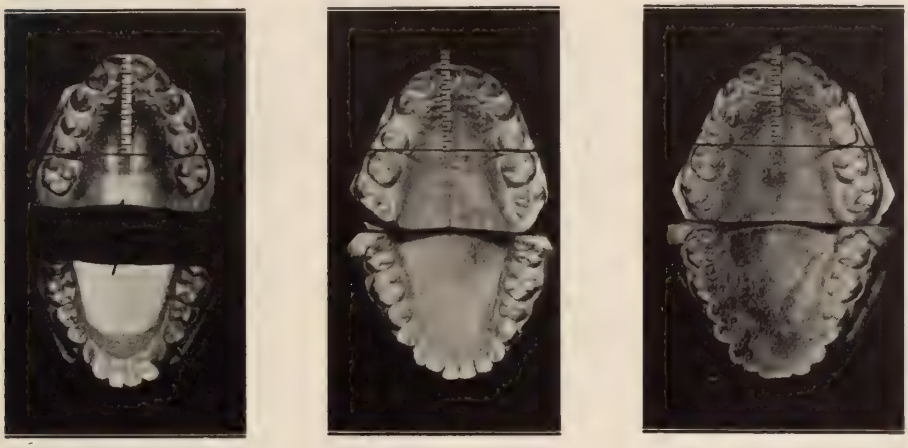
Fig. 5 is a mask picture of the patient's face taken after two years' treatment.

Fig. 6 shows the finished model after inserting artificial teeth in place of the premolars extracted.

Fig. 8 shows the case two years after completion. It will be noted that the so-called double protrusion disappears as the muscles of the face uniformly develop, operating in their normal position.

The viewpoint of the new school seems to be greatly at variance with Dr. Case's viewpoint.

Fig. 7.



The denture is a voluntary organ, composed of thirty-two digits and one hundred and thirty-four inclined planes in contact and normal occlusion. In my

Fig. 8.

Two years after completion. Note how nature is taking care of the thick lips.

opinion, based upon a careful study of physiology, each tooth has a function to perform, and nature has provided that they be constructed of the highest organized matter in the human body to fulfil their purpose. The denture is not a rib which holds up the muscles of the face, and we are not beauty artists, but rather protectors of the first three inches of the alimentary canal. Our aim should be the restoration of nature's mechanical crushing organ, according to her plan to establish the highest physiological value

FIG. 9.

FIG. 10.

FIG. 11.

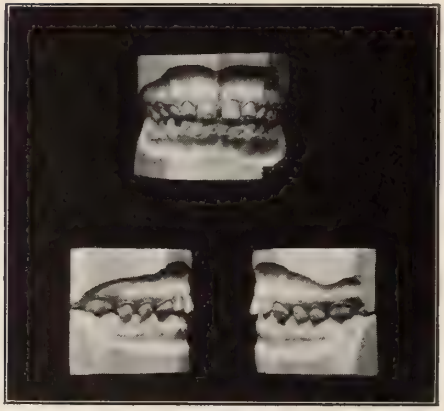


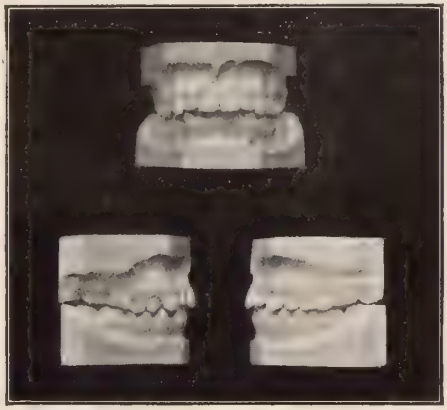
FIG. 12.

in this organ. The effect of the loss of one or two teeth, representing a loss of twenty-four out of fifty-six meat-reducing inclined planes, which have a decided stimulating effect upon the flow of mucin in the salivary secretion, is proved in this year's report of the Committee on Scientific Research.

Furthermore, the findings of Dr. Michel of Würzburg,* Germany—published in the *Cosmos* in the report submitted by me as Correspondent of the New York State Dental Society—who together with two other investigators has carried out a series of experiments as to the effects of missing bicuspids and molars upon the digestion of meat and starch as found in the feces, proves that the absence of the bicuspids produced an increase of the undigested starch products in the excretion of the body. In view of the findings of Dr. Lawrence Baker of Boston, in experiments on rabbits, in which the jaws, skull, and ribs were undeveloped on the side where the teeth were removed, and an interference of function occurred robbing the developing bones of their normal stimuli for development, it would seem that the operator would think twice before recommending any mutilation that would interfere with the functions of the delicate mechanism, provided that the teeth can be returned to their normal position by some other method.

FIG. 13.

FIG. 14.



There are exceptional cases which demand exceptional treatment, but that 20 per cent. of this class of cases in the essayist's practice demand extraction seems to me extraordinary. That the greatest beauty of a type is attained by the normal occlusion of all the teeth has been proved true in the majority of cases which I have treated; also that the expressions of the face, which demand that all the muscles shall act in harmony to express the feelings of the subject, are influenced by the position of the mandible in relation to the whole head.

* See *Cosmos* for November 1910, page 1272.

It has been accepted by a large majority of investigators that the mandible is influenced by muscle stress, when exerted normally or when stimulated artificially. Dr. Martin Dewey's treatise, offered a year ago before this body, goes farther to show how normal function or excessive stress will influence the shaping of the entire cranium.

On the last page of his paper the essayist acknowledges surprise at the abnormal development of the nose of one of his patients within three years. It would appear that his principle of treatment was based upon very unsafe grounds, when he assumes the ability to mentally paint the unfinished picture of his developing subject and to develop a new type. Many artists have attempted as a pastime to portray this development, but have never dared publicly to exhibit the picture of adult life painted after a youthful subject.

In the following I would show three records of cases in which teeth have been returned partially to their normal position in relation to the whole head, after the principle of the full complement of teeth in normal occlusion. In each of these cases it will be noted that the lips become thinner as the osseous parts are carried mesially from the middle line of the head to fill their normal positions. All the expressions of the face—the eyes, nose, and mouth—are distinctly modified and softened. (See Figs. 9 to 14.)

The illustrations in Figs. 15 to 18 show the results of a correction in a case

Fig. 15.

Fig. 16.

of Class III, division 1, without extraction.

Fig. 17.

Fig. 18.

The illustrations in Figs. 19 and 20 demonstrate another correction of a case of class II, division 1, Angle's classification, which was accomplished in six

Fig. 19.

months without extraction of the first premolars.

In conclusion, I would state that in my experience not more than one case in five hundred necessitates extraction of the premolars to accomplish the best results.

Fig. 20.

Dr. J. P. Buckley, Chicago, Ill. It is to be regretted, though not strange perhaps, that there seems to be such a variance of opinion among scientists as to the methods of correcting irregularities of the teeth. A wide difference of

opinion exists among the so-called new and old school of orthodontists—these distinguishing terms being terms which I do not like, and which I do not believe are expressive of the actual conditions that exist, but which nevertheless are used to designate two groups of practitioners, *i.e.* the one comprising those who extract and the other those who do not extract teeth in the correction of irregularities of the teeth. It is not strange that honest, conscientious, and scientific investigators should differ as to methods of correcting these conditions when their methods are based by both groups upon the *causes* of these conditions. In order to study the causes of the irregularities which occur so frequently in the human mouth, we are led into the study of biology and allied sciences, and the fact that man himself and all the life processes pertaining to the development of the human individual are involved in these studies renders them exceedingly difficult. While this is to be regretted, though not strange, yet it seems to the casual observer, and even to those who have observed with more than a casual glance the remarkable progress made in the last few years in orthodontia, that more jealousy, prejudice, and personalities, not to mention ridicule, have been indulged in between the followers of Dr. Case on the one hand and the followers of Dr. Angle on the other than there is any excuse for. I wish that these two groups of practitioners could come to an agreement, whereby, I believe, they would advance that branch of dentistry even more than they have done in the past; this, however, seems almost more than we can expect or hope for.

Dr. G. F. Bowman, Pittsburgh, Pa. Dr. Case in his paper seemed to advise against the early expansion of the deciduous arches, especially when the lower incisors are erupting in slight malocclusion or slightly out of alignment, because nature would correct these irregularities. If that be true we wish to have this statement confirmed, because, if so, we have been doing a great deal of injury in expanding arches. If nature will really correct these irregularities, I would have Dr. Case explain to us why teeth are rarely observed to be in perfectly normal occlusion, while it is exceedingly common to see them in malocclusion.

Dr. Case (closing the discussion). In answer to the last speaker, I may say that one reason why he sees so many more cases of malocclusion than he did formerly is that he is now an orthodontist, and naturally is far more observing.

I shall not detain you long because I realize that you are already tired out with this lengthy paper and its discussion. Nor has there arisen any material evidence in the discussion, as far as I have been able to observe, in opposition to the claims of the paper which is not fully answered in the paper itself, except certain unwarranted and false statements and inferences in regard to my teachings and methods which I do not have the time or disposition to even notice.

I must say that I am somewhat surprised at the tame effort at a rebuttal of my attack upon the bone-growing fallacy. I supposed that at least an attempt would be made to show that no claim had been made that bones could be artificially stimulated to grow *beyond* their inherent sizes. I therefore prepared myself to show by quotations from different writers that I had not overstated the facts. Since no denial has been made, we may take it for granted that such was really

the belief of those who advanced that theory, which now certainly must fall before evidences of organic evolution.

I repeatedly said in my paper that bone may be stimulated to renewed growth. For years that has been one of the acknowledged accomplishments of orthopedic surgery, for which no special proof is required. My claim is that an interstitial growth of bone, whether from artificial stimuli or otherwise, cannot be induced beyond the inherent size of the bone.

In the stimulation brought about by the correction of malocclusions, dormant activities may at times be revivified, and stunted development stimulated to renewed growth up to full inherent size. If the upper denture is protruded in relation to esthetic facial lines, and the lower teeth and mandible are retruded in relation to the upper, though otherwise they be normal, the placing of the teeth in normal occlusion by forcing the lower denture forward will not cause the mandible to grow to a harmonizing size unless that size was stamped upon the mandible by inheritance, and that which in all probability it would have assumed without interference.

It is not difficult to make a collection of lantern slides which show the deleterious effects of extraction in Dr. Angle's class II. It is also possible for anyone exhibiting these pictures to claim or to infer that such is the kind of practice that I teach or that is practiced in "rational" orthodontia. Whereas, in truth, I would pronounce every one of these cases of extraction to be malpractice, notwithstanding the possible fact that the upper teeth were protruding far beyond normal occlusion with the lowers.

Section I then adjourned until a later session.

FRIDAY—Third Session.

The third session of Section I was called to order at 10 o'clock Friday morning, July 28th, by the chairman, Dr. Stanley L. Rich.

The first order of business as announced by the chairman was the reading of a paper by Dr. VARNEY E. BARNES, Toledo, Ohio, entitled "Dental Impaction and Preventive Treatment," as follows:

Dental Impaction and Preventive Treatment.

By VARNEY E. BARNES, D.D.S., Cleveland, Ohio.

Impaction is a forcible collision or contact of a moving body with another either moving or at rest. *Dental impaction* is the forcible contact of abnormally erupting teeth with resistive tissues or with other teeth.

ETIOLOGY OF IMPACTION.

Dental impaction is therefore a condition of abnormal dentition. It begins with the difficult teething of the infant, and in greater or lesser degree may persist through adolescence and maturity. The generally recognized and feared impaction of third molars is the terminal and one of the greater degrees of a sequence of impactions which began with the difficult deciduous dentition and are more easily recognized, in varying degrees, in the crowded eruptions of the permanent teeth.

Impaction implies an impetus and a reaction. The impetus is in the tooth erupting, usually into too small an arch, under the stress of the vertical eruptive force. The reaction consists in the irregularity or crowding of teeth and the resultant disarrangement of the associated nervous system. This disarrangement may be produced with a practically normal nervous organism, but more probably with the abnormal, upon which it is more likely to act and show the most marked effects.

DEFECTIVE DECIDUOUS DENTITION.

The difficult teething of the infant results from a defective development, which is generally associated with artificial feeding.

Artificial feeding not only implies imperfect feeding and assimilation, but also is indicative of the necessity for that artificial feeding, which means the failure of the natural food. The failure of the mother's milk to properly nourish the infant indicates that the prenatal conditions were not correct or normal, and that neither the food nor the child were normal or suited to one another, therefore prenatal and postnatal developments must be more or less deficient. Heredity, by producing tendencies toward inharmonious developments of bone and teeth, may produce difficult teething without any indications or history of improper feeding or of abnormal prenatal conditions.

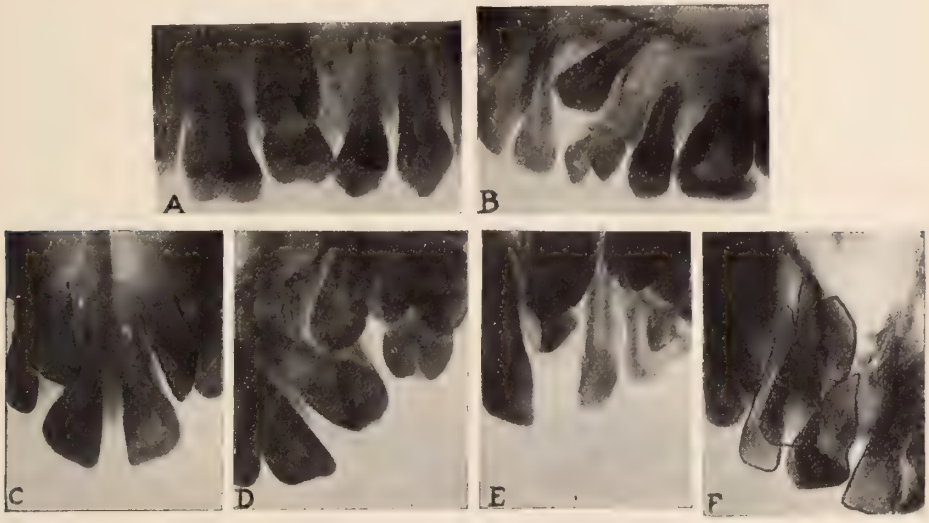
The normal teething of infancy and youth should occur easily and painlessly, and be unaccompanied by any nervous, muscular, digestive, or other abnormal disturbances. Teething should most certainly be attended by some stress, but that stress should only be of an amount sufficient to produce a proper physiological development. An undue stress may change a physiological condition to a pathological one, depending upon the amount of stress, the direction of its deviation, and the character of the organisms upon which it may operate.

PERIODS OF IMPACTION.

The nervous, digestive, and temperature disturbances of the teething infant

have long been known. The evils of third molar impactions are also well recognized. Between these two extreme stress eruptions there are at least from thirteen to fifteen years, which include the eruptive periods of the permanent teeth. Considering the fact of the prevalence of dental irregularity among all classes in nervousness, defective vision, twitchings, blinking, teeth-gritting, adenoids, enlarged tonsils, etc. Within these years children's diseases, including dental caries, perform their ravages. To sum up briefly, these are the stress years, in which the future health of the individual is insured or undermined.

FIG. 1.



A, Deciduous molar at fourteen years, causing pain and impaction of bicuspid. B, Impacted canine (thirteen years) causing eye-strain and aggravating mental defects. C, Laterals impacted (eight years). D, Central, lateral, and canine impacted, with a resultant blinking of the eyes. E, Central and supernumerary impacted. F, Central and second supernumerary impacted beneath large supernumerary incisor (fifteen years). Pain and facial twitching on corresponding side of face.

modern civilization, it is most reasonable to conclude that between the impaction of infant teething and that of third molars there are other periods of impaction. These other periods of impaction approximate the eruptive periods of the permanent teeth, being evident from the second to the seventeenth year or later in greater or lesser degree. (Fig. 1.) These are the years in which the child grows rapidly, forms habits readily, obtains its greatest amount of schooling, develops

IMPACTION AS A FACTOR IN IMPERFECT DEVELOPMENT.

Impaction, *i.e.* difficult teething at any age, while being a result of degeneration, is itself a great factor in further degeneration or health failure. Acting as it often does upon a weakened or defective organism at a critical period, and affecting the nerve and blood supply, it may destroy or alter function and may prevent development, or delay still further

one which is defective or delayed. While impaction is usually but one of a series of factors of the vicious cycle which may combat an individual's health, it may be or become a determining or major factor. The removal of that factor may aid in the removal of other evil factors, and eventually restore a more healthy tone to the entire being.

Dr. Eugene S. Talbot says: "The eruptive fevers in children have a tendency to leave the system in a neurotic condition. . . . There is a general arrest of development of the whole body. Such persons not infrequently remain sickly, neurotic, or morally imbecile." Suppose we add to this pitiable result the evils of impaction, which undoubtedly would render a bad condition much worse, and might even destroy any chance for or delay recovery! But we do not have to suppose any such condition, for it really exists. Dental impaction is a result of early and a major factor of later defective development.

Dr. Talbot in his extensive writings has shown that dental irregularity and degeneracy, insanity, and developmental neuroses are closely related.

Dr. Henry Upson has clearly indicated a causal relation between impacted teeth and the common nervous and mental diseases. He has reported numerous cases of insomnia, melancholia, insanity, hysteria, and indigestion which have been cured by relieving the dental impactions present in each case. His treatment has been extraction.

IMPROPER ORTHODONTIC TREATMENT A CAUSE OF IMPACTION.

Dentists have known that excessive separative or orthodontic pressures when continued too long produce nervousness, extreme irritability, and suffering. Such pressures were impactive pressures.

Orthodontic pressure improperly applied is as great a factor in the causation of dental impaction as is excessive pressure. The application of force in the treatment of dental irregularities is too often made without due regard being given to the laws and forces of development. Particularly is this true in regard to the posterior movement of molars to provide a pleasing alignment of anterior teeth. Orthodontic treatments designed to provide for tooth-shifting and tilting in the mouths of patients over twelve years of age have been applied in much younger children, with the creation of posterior impactions as the evil result.

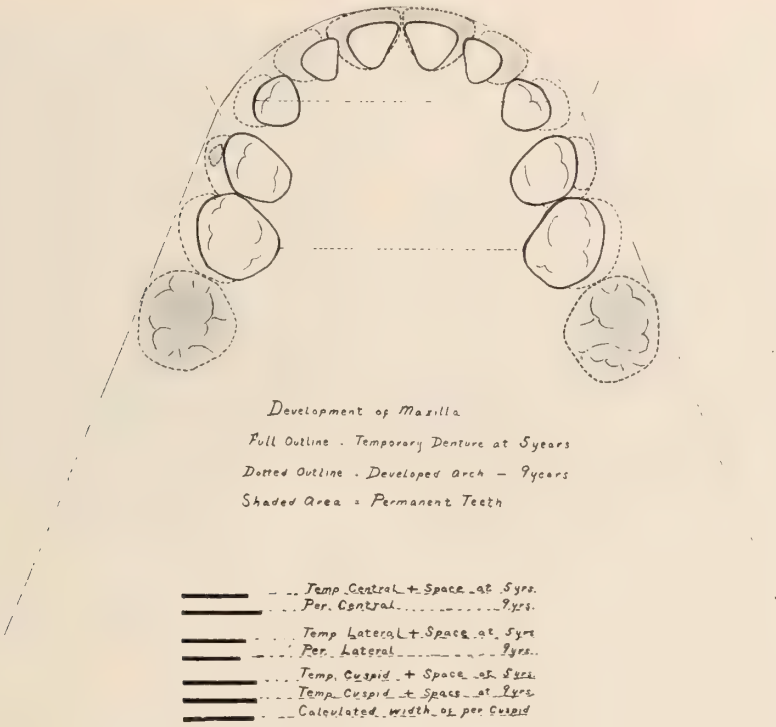
NORMAL ARCH DEVELOPMENT.

Before showing the effects of such treatment it seems advisable at this point to note what appears to be the normal plan of arch development; then, with the plan clearly in our mind, we shall better understand the formation of impactions, so as to outline a plan for a rational preventive treatment. The preventive treatment for dental impaction should be practically the same as that for dental irregularity, the two terms being often synonymous.

A study of tooth forms reveals rounded, convexed, and concaved mesial and distal surfaces as well as labial, lingual, buccal, and occlusal ones. These surfaces and forms indicate that the *teeth were evidently designed to erupt or be without lateral contact with any other teeth until they reach a vertical height equal to that of adjacent teeth in occlusion,* or until occlusion with teeth in the opposite jaw occurs. The sharpened or pointed cusps and the rounded surfaces indicate that

the teeth were intended to pierce the gums and leave a ring of gum tissue designed and suited to contract about the constricted neck of the tooth, and at all times during the tooth eruption and gum shrinking to present the best possible approximation to the normal self-cleansing and protective functions of the gum tissue which is evident in the final state when the teeth are fully erupted and in normal occlusion. This means that the deciduous and permanent teeth must erupt without lateral contact; that before the permanent teeth erupt, spaces indicative of proportionate jaw development must be provided between the anterior deciduous teeth. These conclusions, based upon tooth forms, have been confirmed by actual observations of jaw developments and tooth eruptions. Nature provides that the deciduous molars shall exceed the succeeding bicuspids in mesio-distal diameter, evidently to provide for an easy eruption of the bicuspids just prior to the mesial movement of the first permanent molar and the eruption of the second permanent molar. Why should nature plan to prevent a wedging eruption in this part of the mouth and not in the incisal and canine regions? The full width of the incisor and canine crowns is attained between the fourth and sixth years. The incisors all erupt normally before the eighth year. At the fifth year the deciduous canines normally have distal spaces, which with the tooth

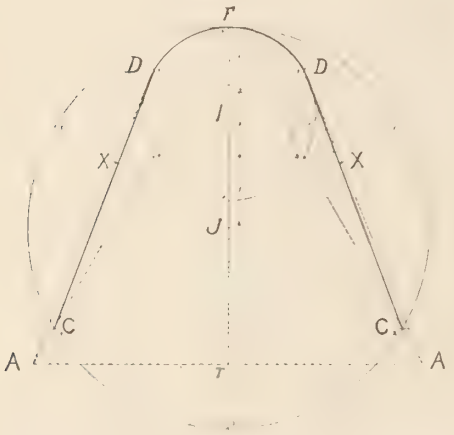
FIG. 2.


Development of Maxilla
Full Outline . Temporary Denture at 5years
Dotted Outline . Developed Arch — 9years
Shaded Area = Permanent Teeth
Temp. Central + Space at 5yrs.
Per. Central 9yrs.
Temp Lateral + Space at 5yrs
Per. Lateral 9yrs.
Temp. Cuspid + Space at 5yrs.
Temp. Cuspid + Space at 9yrs.
Calculated width of per Cuspid

Development of dental arch at five and nine years.

provide more than enough room for the eruption of the permanent canine; thus at some time not later than eight years of age the child's jaw attains enough width to permit all the teeth to erupt, and no further width development is needed after that age. Observations on a patient of five years of age (see Fig. 2) revealed lateral and canine distal growth

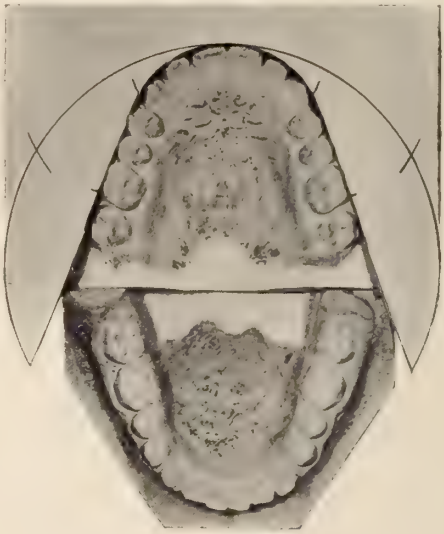
FIG. 3.



Mathematical calculation of the smallest dental arch into which given teeth can erupt normally, C D D C. Bonwill's arch from the same teeth is A D D A.

or developmental spaces which, with the respective deciduous teeth, more than equaled the width of the succeeding permanent teeth. The upper canine space persisted for four years, and up to the time of the eruption of the permanent canine at ten and a half years. The lower canine was in place at nine years. At five the central space plus the central width was less than the width of the succeeding permanent central. Before seven years, however, the space increased, and the increase in width between the laterals was enough to allow of easy eruption of the centrals, and equaled the increase in width which occurred in the jaw as measured across the molar region. This indicates that the width development was lateral, and must have occurred along the median suture—*a known region of development.* The evidence in this case is that the width development is complete before the seventh year. The suture, being a known region of development, must therefore be a known region

FIG. 4.



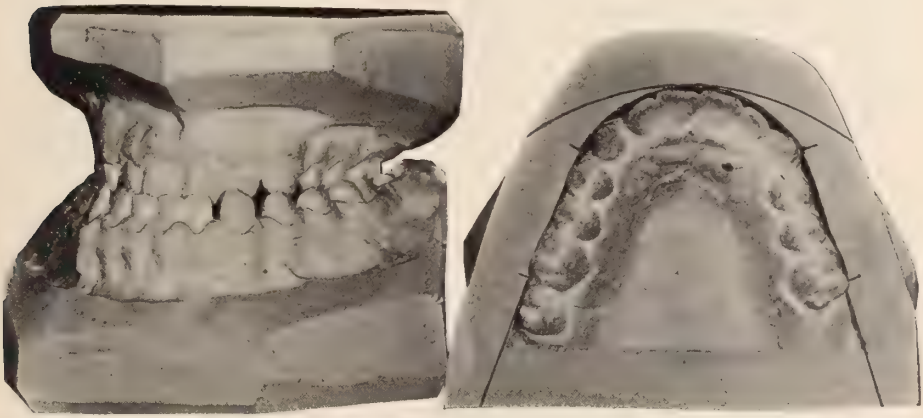
Comparison of the calculated arch with one of the best natural arches.

of arrest in development, and the opening of the suture is the indicated curative treatment. This suture opening has been advocated also by Dr. G. V. I. Brown. The eruption of the central incisors marks the completion of the width development at or about the seventh year. This gives us the clue as to when to apply preventive treatment for dental irregularity and impaction. This *must be before the seventh year, and should be before the fifth or sixth year.* We may therefore expand the arch to its full limit before the seventh year.

EXAMINATION AND CALCULATION OF NORMAL ARCH DEVELOPMENT.

Other cases of development watched confirm the observations and conclusions drawn from the last one. Recently I examined 980 Italian school children from five to fourteen years of age, and found 68 perfect mouths, or about 7 per cent. These 7 per cent. of perfect mouths passed the tests of sufficient growth spaces at five years of age, or before the eruption of the incisors and canines, to permit the eruption of incisors and canines anterior to the deciduous molars and without lateral contact until after occlusion; also the deciduous molar spaces were maintained to permit the eruption of the bicuspids to occlusion and then to permit of the mesial movement of the first permanent molar prior to the eruption of the second molar. All of these teeth were regularly arranged and the arches normal. The faces were full, rounded, and normal, and the children were the best in school. About 35 per cent. of the cases examined were so nearly perfect in many appearances that they would probably have been classed as perfect by general operative dentists, and in a prior examination had been so classed. These cases presented the evidence of lateral contact eruptions, the deciduous molar spaces having been utilized to permit the eruption of canines and bicuspids without allowing any mesial movement of the first molars. In most of these cases the arches appeared regular and fairly broad, but the teeth pressed too tightly together, or there was excessive overbite, or both. The arches were placed too far posteriorly in the mouth. Each tooth had erupted a little too far posteriorly at the expense of the next posterior tooth.

FIG. 5.



Calculated arch agreeing with natural arch which is too small for good facial balance. Upper teeth bite entirely within lower arch.

In determining regularity of the teeth and freedom from impaction in eruption, the necessity becomes apparent of some ideal approximate calculation of the dental arch from the teeth which are to erupt into that arch. It was Bonwill who discovered a means of such calculation.

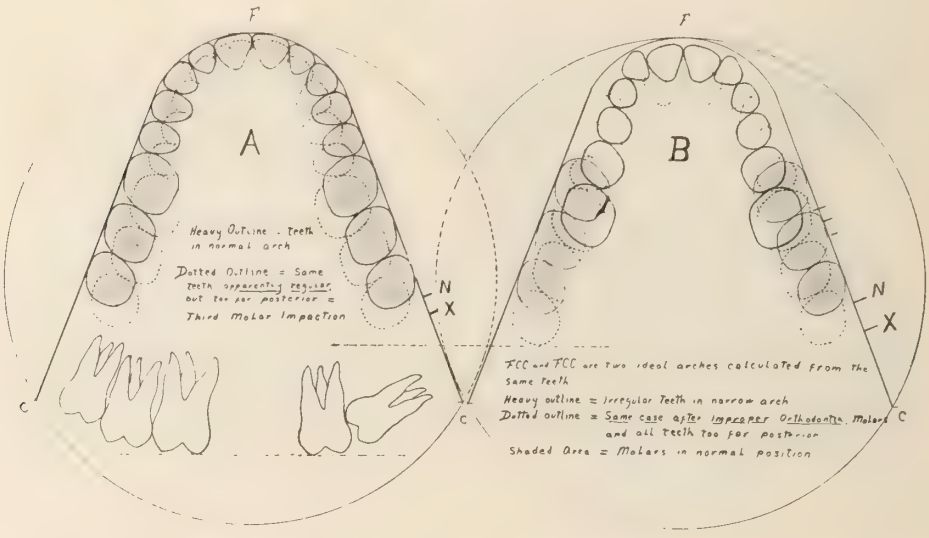
Bonwill's method of calculation. The mesio-distal diameters of the permanent

central, lateral, and canine in combined width and used as the radius of a circle furnished the anterior arc of the dental arch. (Fig. 3, D–F–D.)

This calculation was proportionate to the teeth in each case. His calculation for the position of the remaining teeth was based upon an *average* measurement gathered from many cases. This constituted an error, which Dr. Hawley endeavored to correct by using average tooth measurements and calculating the dental arch from these averages—when the lateral and canine were not present. Hawley's determination also depended upon the accuracy in drawing a tangent, which is difficult and open to considerable error.

A new approximate arch. Adopting Bonwill's calculation of the anterior arc and drawing it (Fig. 3, D–F–D), I take six times the mesio-distal diameter of the upper central incisor, F–J, using it as the radius of another circle, F–C–C, upon which the radius is then taken to mark six arcs, as in Bonwill's circle F–D–D. These arcs mark the points C C, which are then connected to D D by lines D–C, D–C, upon which the mesio-distal diameters of bicuspids and molars are marked, giving the lateral width limits of the dental arch, D D and X X. *This furnishes a mathematical calculation of a coronal alignment arch proportionate to the teeth,* and is the smallest arch into which the teeth can erupt easily and without lateral contact until occlusion. Broad or narrow teeth will furnish proportionately broad or narrow arches. Actual tests of arches calculated in this manner have shown them to agree with the most perfect natural arches I could find (Fig. 4), and with the best orthodontic results. The calculation of these arches has revealed many instances in which the natural arch as

FIG. 6.


F
A
Heavy Outline = Teeth in normal arch
Dotted Outline = Same teeth apparently regular but too far posterior = Third Molar Impaction
N
X
C
F
B
FCC and FCC are two ideal arches calculated from the same teeth
Heavy outline = Irregular teeth in narrow arch
Dotted outline = Same case after improper Orthodontia. Molars and all teeth too far posterior
Shaded Area = Molars in normal position
N
X
C

A, Dotted outline shows positions teeth are liable to assume when erupting into too narrow an arch. N, Normal posterior of third molar; X, Abnormal or impacted position. *B*, Dotted outline shows posterior movement of teeth from improper orthodontia. Size of teeth is same as in *A*, and X in *B* marks a greater impaction than in *A*.

found in the mouth agreed with or was greater than the arch calculated from the that the dental arches were in perfect positions. This may indicate that the

FIG. 7.

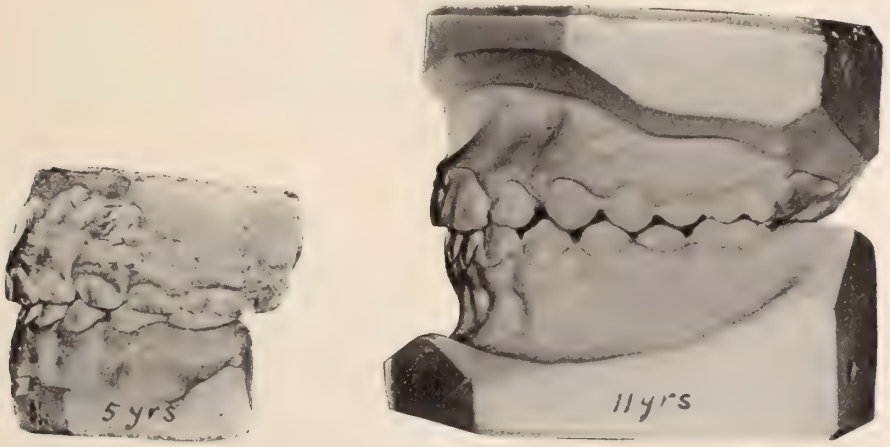
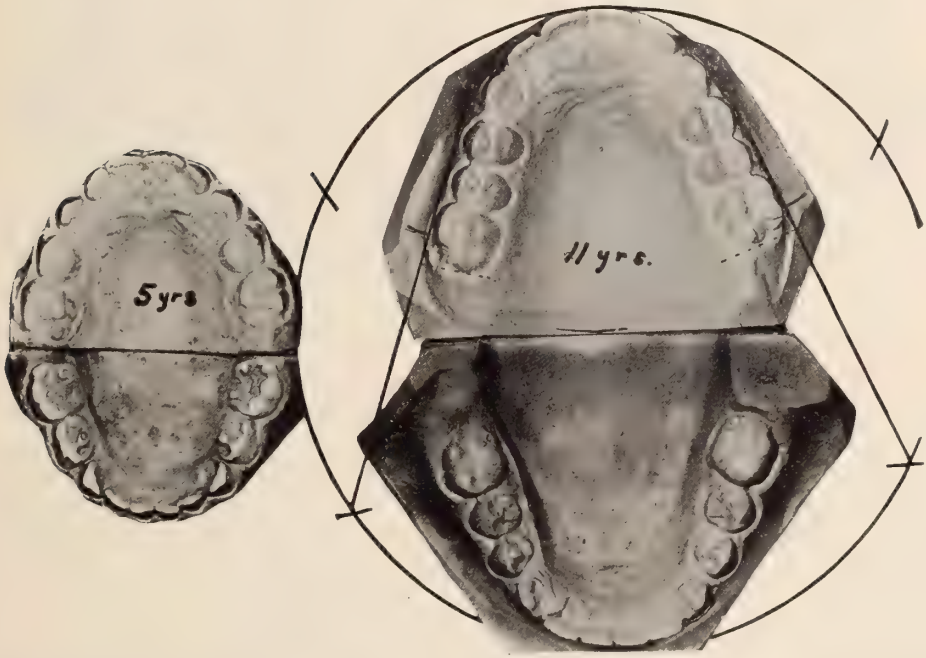


FIG. 8.



FIGS. 7 AND 8: Side and occlusal views of a case at five and eleven years in which the expansion was accomplished with a horizontal hinge expansion arch. The expansion has been at the expense of the molar positions. The arch is too narrow, and at thirteen years shows the crowding and twisting of incisors—due to second molar pressure.

teeth, while at the same time the facial contours did not agree in the indication teeth were too small for the jaw development provided. An example of this is

shown in Fig. 5. If this is true, and it appears to be, the converse must be true. In some cases teeth are formed too large for the jaw development provided. This does not mean that symmetrical development can never be attained, for there are many cases in which, if treated properly and early, expansion and development of tion of expansion. *It must be used as a coronal alignment arch only,* the inclinations of the teeth and the palatal arch indicating the size and shape of the apical arch, which should be proportionately full, the apical arch outlining the apices of the roots. *The dental arch may be fully attained, and still be too far ante-*

Fig. 9.

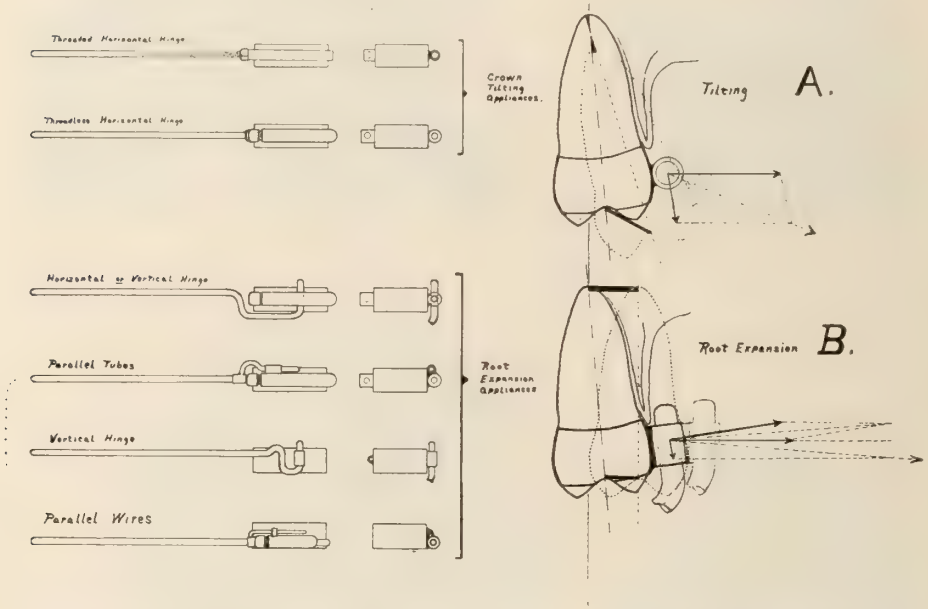


Illustration of the principles involved in tilting and root expansion appliances.

a considerable area beyond the dental area may be produced, and most pleasing results may be obtained without the extraction of any permanent teeth. The same cases, if treatment is begun at from eight to ten years of age or later, may not be so yielding to treatment, and may result in too full expansion, or the alternative, *i.e.* extraction.

ARCH CALCULATION AS AN INDICATOR FOR PROPER AMOUNT OF EXPANSION.

The *intelligent* use of this calculated arch will indicate the amount and direc-

rior or posterior in relation to the rest of the skull. This must be understood and considered. The calculated arch therefore, as demonstrated, is the *smallest arch* into which the teeth may erupt easily—its posterior placing may mean second or third molar impactions with anterior close bites; its anterior placement means too full lips and facial disfigurement. To either of these evils judicious extraction would be preferable.

The tests of this calculated arch indicate that it is the ideal arch, as Bonwill believed, and when the teeth are

anywhere near the ideal size for an individual, this arch is the *best approximate coronal limit for expansion* and guide in the relief of impactions and dental irregularity.

There have been cases in which teeth have erupted into too narrow or too short an arch, and have become apparently

EFFECTS OF INJUDICIOUS ORTHODONTIC TREATMENT.

Improper orthodontia is productive of impactions. A certain well-known type of appliance in which the first permanent molars are used for basic anchorage in moving all anterior teeth, as

FIG. 10.

Occlusal views of teeth before treatment began. The arch at five years was 0.4 mm. narrower than at two-and-a-half years.

regular. The result of such an eruption is wedging or impaction; each tooth as it erupts encroaches a little on the territory of the next posterior tooth. If the permanent teeth are small in proportion to the deciduous ones, but little evil may result, but if the permanent teeth are of normal or greater size, the impaction may be severe anteriorly to the first molars, or become apparent only later in the very evident malposition or impaction of third molars. (Fig. 6, *A*, x.)

well as to expand the molars, is creative of molar impaction (Fig. 6, *B*). It temporarily relieves anterior stress at the expense of molar impaction. In this type of appliance a horizontal tube on the molar band is employed to carry the expansion arch to which the anterior teeth are ligated. Every particle of force applied to the arch must be accounted for. Equal pressure is put upon the anchorage and upon the teeth to be moved, with the result that the first mo-

lar must move backward or at best be held back, encroaching upon the area of the second molar, which may be impacted, or in turn impact the third molar. (Fig. 6, *B*, x.)

This type of appliance is being used in patients from four to ten years of age, anchorage being obtained upon the deciduous molars or the first permanent molar, with a resultant greater posterior shifting of unstable molars into the space that should be free for the proper eruption of subsequent molars. (Figs. 7 and 8.) The first permanent molar is unstable in position before the eruption of the second molar, and extreme care should be observed in placing pressure upon it before that time. This appliance is further inefficient in that it has a horizontal tube which acts as a hinge in lateral expansion and tilts the crowns buccally instead of moving the teeth bodily. It is strange that this good *coronal alignment appliance* should be used so generally and unscientifically as a universal appliance. (See Fig. 9, *A* and *B*.)

PRACTICAL PREVENTIVE TREATMENT.

The preventive treatment has already been partially indicated in the establishment of an approximately ideal arch which is proportionate to the teeth and calculated therefrom. Whenever we find the condition of difficult teething in the infant, we may be almost certain that irregularity and impaction will follow. The lack of spaces for growth before the age of from three to four years calls for their artificial production, to permit the permanent teeth to erupt easily. Development has been shown to occur chiefly laterally and along the median suture.

FIG. 11.

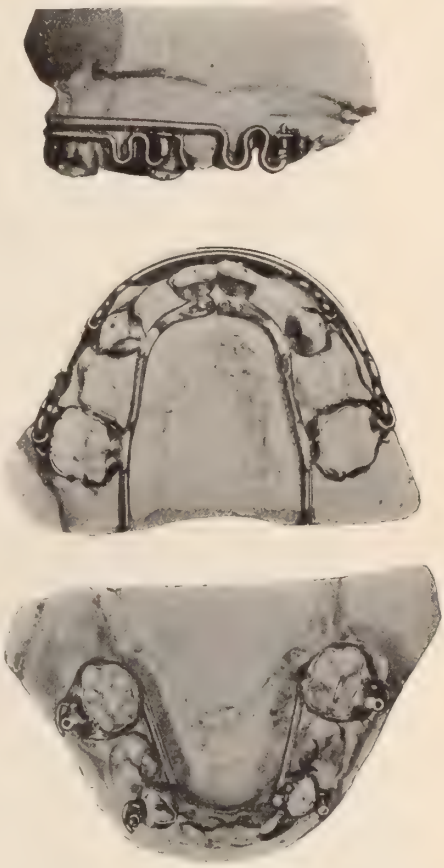
Large cranial and small maxillary and mandibular development.

Therefore the preventive treatment must be instituted by means of an appliance which will produce a lateral bodily movement of teeth and bone, open spaces to the calculated width before any incisors erupt, and open the median suture without producing any posterior pressure.

This can best be illustrated by practical cases. Fig. 10 shows views of a child's teeth at two and a half and at five years. The arch at five years was 0.4 mm. narrower than at two and a half years. He was a "bottle" baby through necessity, and great difficulty was encountered in obtaining even a living feeding. Teething was extremely difficult, being accompanied by irritability, sleeplessness, indigestion, and fever. I lanced repeatedly and thoroughly, immediate relief following in every instance. This was done after the physician's attempt to control by feeding had failed.

The large cranial and small maxillary development associated with the necessary artificial feeding enabled me to diagnose dental irregularity and impaction before any deciduous teeth appeared. Fig. 11 shows the patient's face at five years of age. At this period I felt the necessity of beginning the preventive treatment before other symptoms of impaction became evident. An appliance was made, using the principle advanced by Dr. Ainsworth, but much modified and improved. Fig. 12 shows the appliance for producing lateral expansion and opening the suture. Fig. 13 shows radiographs taken by Dr. Lodge before and after the suture was opened, an interval of fourteen days. In (*c*) is illustrated another opened suture; the radiograph was taken by Dr. Hill. The approximate sizes of the permanent teeth were obtained from these radiographs—for the centrals 8.7 mm., the laterals 6.4 mm., the canines 7.5 mm.—and from these measurements the ideal arch was calculated as shown in the upper part of Fig. 13. The mother's teeth measured 8.6 mm., 6.4 mm., and 7.5 mm.,

FIG. 12.



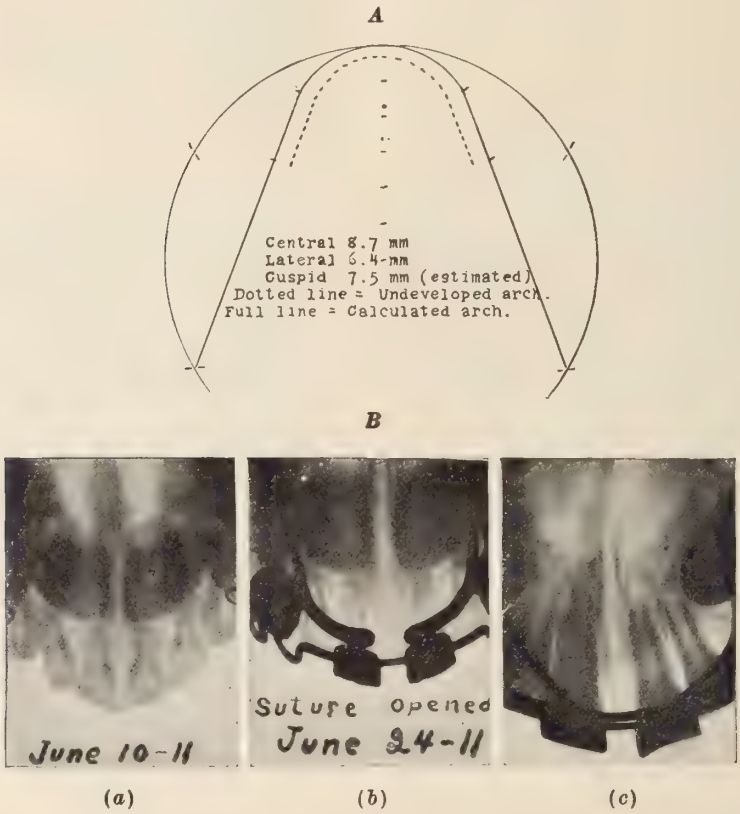
The appliances used to expand and open the median suture. Note the double vertical hinge arches, the lock springs, the lingual attachment wires which are also flattened to form bite-planes, and the double spring loops.

respectively, so that the approximate measurements are probably nearly correct.

When the upper central incisor erupts, a correction can be made if necessary. This will be in plenty of time, the first

calculations giving an idea of the amount of expansion required, and later or intermittent treatments producing the actual amount required. The arch will be expanded so that the incisors and canines will erupt anteriorly to the deciduous anterior, and the facial and dental results are satisfactory. The irregularity and impaction have been relieved and prevented. The expansion has not been produced at the expense of the posterior teeth. General health is much improved.

FIG. 13.



A, The arch of the deciduous teeth contrasted with the arch into which the permanent teeth should erupt, and to which the temporary arch is to be expanded. *B*, (*a*) Radiograph before opening of suture, and showing size of permanent teeth. (*b*), The suture opened—X ray by Dr. E. B. Lodge. (*c*), X ray of another suture opened in the same manner—X ray by Dr. Hill.

molars; by this treatment the maxilla should be developed to harmonize with the large cranium. Fig. 14 shows different stages of suture opening.

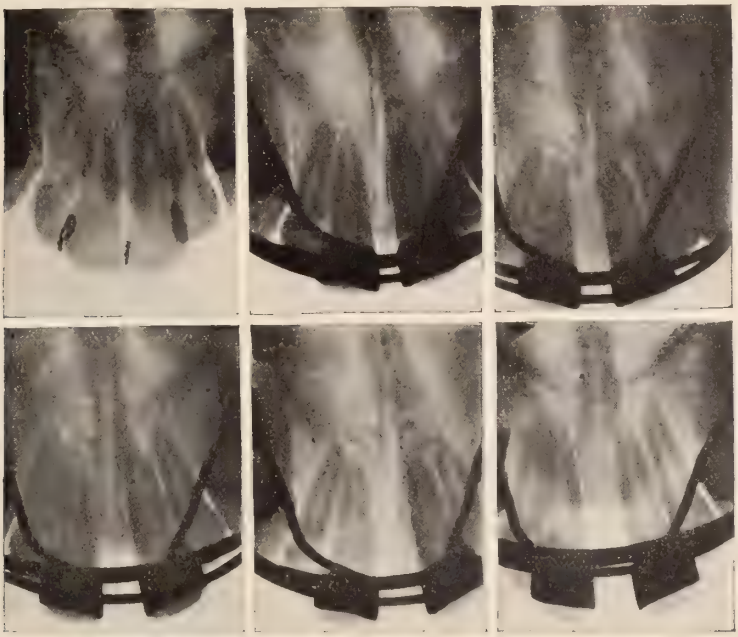
Fig. 15 is an illustration of a case treated at a later age, namely, seven years. The expansion was lateral and

Fig. 16, A, is an illustration of a case at nine years. More deformity is evident in the small arch, and in the malposition of the permanent teeth erupted. The deciduous canines being either lost or too weak, necessitated a modification of the appliance for opening the suture. The

central, lateral, and molar were banded and attached by a soldered lingual bar, improves breathing and blood supply, and in nearly every instance has reduced nerv-

FIG. 14.

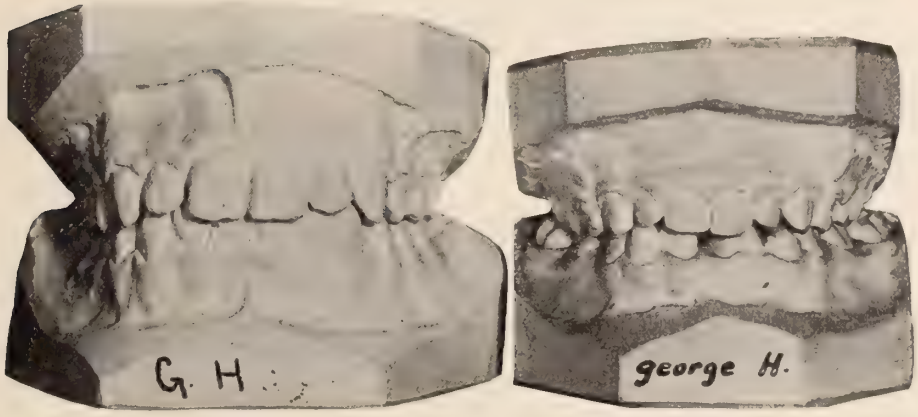
Feb. 10. *Feb. 23.* *Mar. 2.*



Mar. 10. *Mar. 16.* *April 14.*

The different stages of suture opening—X rays by Dr. E. B. Lodge.

FIG. 15.



Front view of the results of preventive treatment.

as shown. Opening the suture produces lateral expansion, opens the nasal spaces, ousness. In this case (see Fig. 16, B) it separates the central roots, which are too

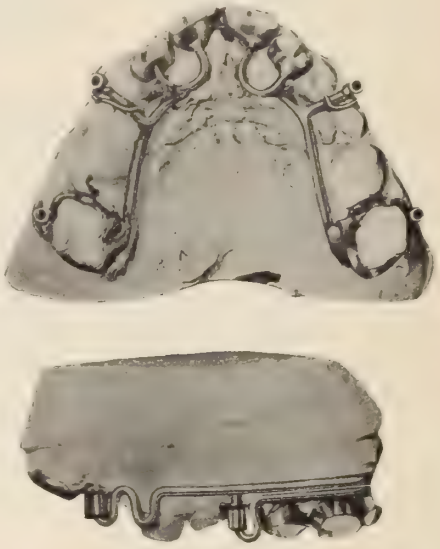
close together; after expansion has been secured the centrals are cut loose, and the crowns brought together, leaving a V-shaped space between the centrals, as it should be normally. This treatment does away with the cauterization of the frenum when it is abnormal in size and position. After the centrals are brought together and forward, the laterals are cut loose from the lingual wire and drawn forward and close to the centrals, thus opening sufficient space for the canines, with a minimum of posterior pressure. This case illustrates a type and a condition which is difficult to treat on account of the age, *i.e.* from nine to ten years. This is the transition period, in which the deciduous teeth are being shed, and the permanent teeth just erupting, both being unstable and offering little chance for bone expansion through attachments made to them. In many cases, in spite of all preventive efforts, a posterior and impactive movement of the molars takes place, or the molars remain too far posterior. Heretofore no treatment has been devised to overcome this evil except the intermaxillary elastic ligature, which shifted the evil result from one jaw to the other in a compromise which resulted in a bimaxillary posterior occlusion. This has usually resulted in a failure of retention, which has been charged against the retention device instead of to incomplete regulation.

FACIAL ANCHORAGE DEVICE.

To overcome this difficulty, I devised in 1910 a facial anchorage or mask (Fig. 17), which, being patterned after a base-ball mask and having strong elastics over and around the cranium, and an external labial arch, admitted of pressure, elastic or rigid, being exerted between the posterior teeth and the facial bones. The pressure can be used to move forward or retain posterior teeth, or all teeth. This device has rendered possible the shortening of the time of treatment, and has offered in many cases the only alternative to the extraction of teeth. It promises success in many cases that without its use could only result in partial failure. First and second molars, in fact all the anterior teeth, can be pulled forward to relieve and prevent third-molar impaction.

FIG. 16.

(A)

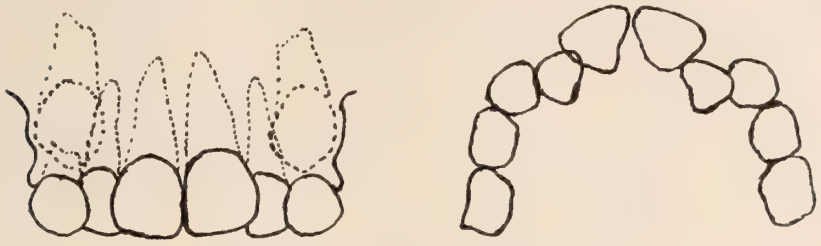


Modification of suture-opening appliance.

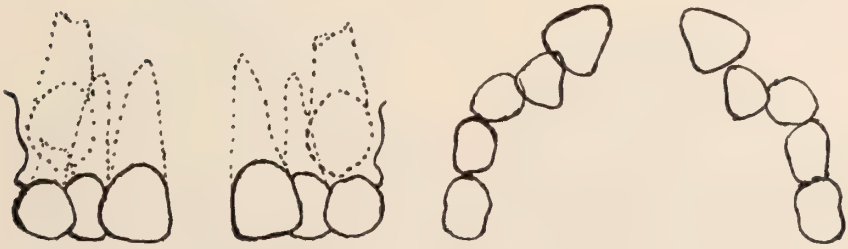
See diagram (B) *opposite.*

Figs. 18 and 19 illustrate a case in which the lateral or buccal and anterior expansion has been accomplished with the vertical-hinge expansion appliance, the suture having been opened. The intermaxillary elastics have been used, with the result that the lower teeth drifted backward and opened the bite too much. The case was then allowed to rest a considerable time; then the facial anchorage

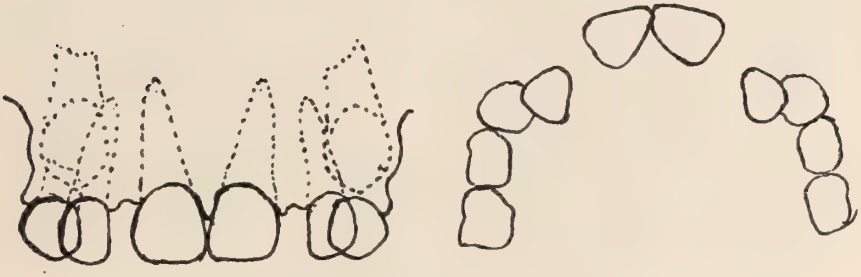
(B) *Diagram of the plan of arch expansion without creation of posterior pressures.*



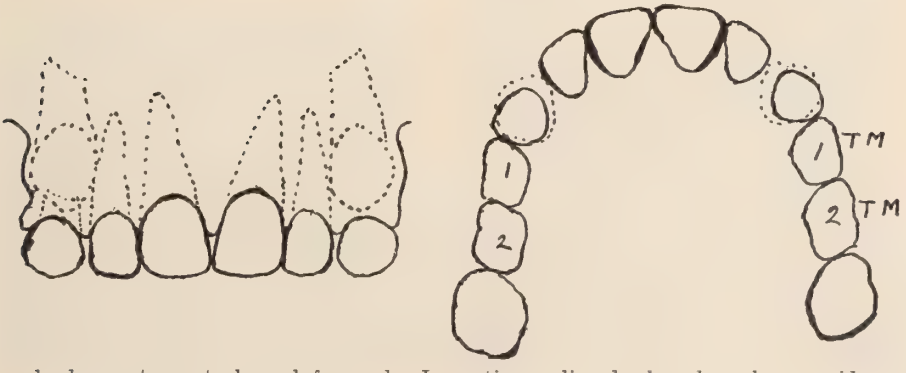
Impaction—narrow and short arches.



Lateral expansion—suture opened.

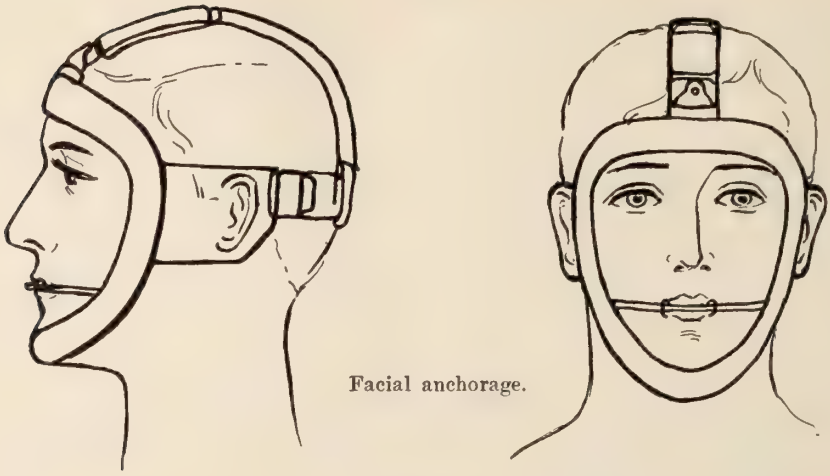


Crowns forced together and forward.



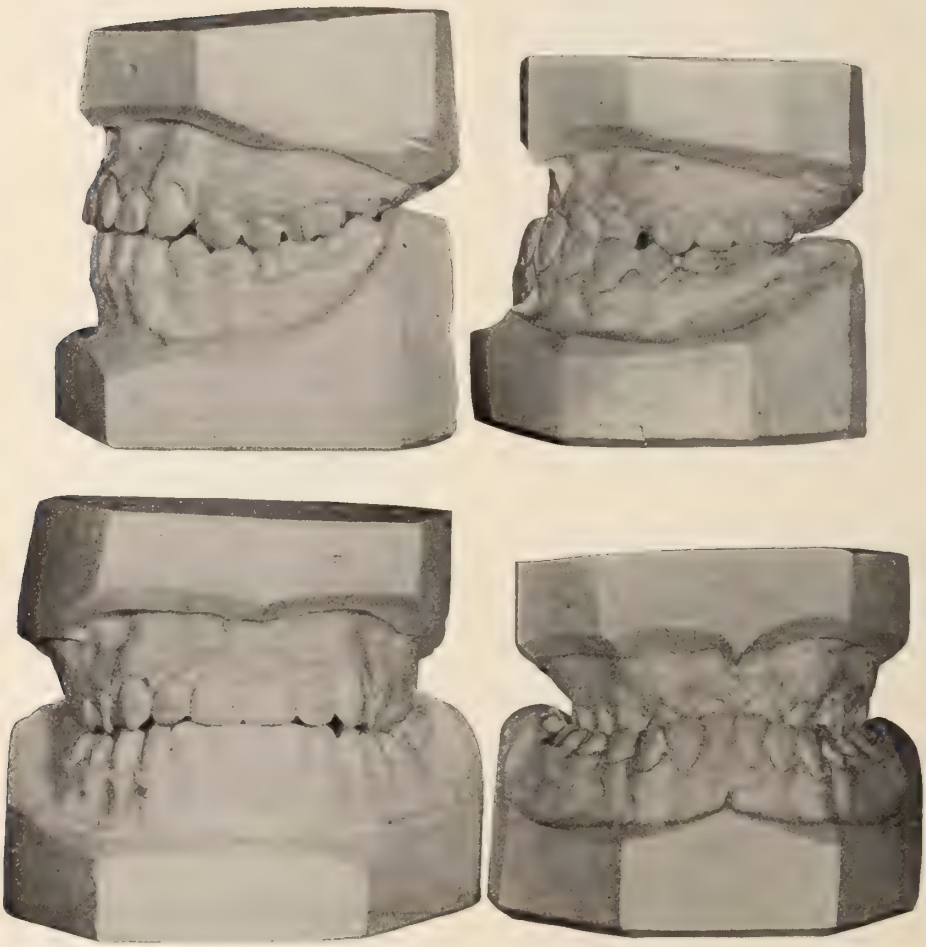
Laterals drawn to centrals and forward. Impaction relieved; broad arch; cuspid space.

FIG. 17.



Facial anchorage.

FIG. 18.



Results obtained by lateral and anterior expansion, but still deficient, and requiring the facial anchorage to produce an anterior movement of the maxillary teeth.

was devised and applied to the upper teeth, and is now carrying them forward and building out the corresponding portion of the face.

Figs. 20 and 21 illustrate another case of lateral expansion with suture-opening, before and after expansion to the ideal arch. The patient, a child of eight years and eight months, was nervous, had a sallow complexion, and suffered continually from indigestion. Her eyes blinked and her face twitched. The general condition was such that the parents feared the effects of orthodontic pressures.

After studying the case I felt certain that a rational treatment would materially benefit the child, and informed the parents that the orthodontic treatment might and probably would improve the general health. Shortly after the pressures were applied, the health began to improve, the indigestion gradually subsided, and the blinking and twitching disappeared. Now the patient's complexion is clear and ruddy, nervousness is not noticeable, and the general health is fine. During the past winter the child did not suffer with the colds to which she was subject in previous years. Prior to treatment the child was a nasal breather and slept well; therefore the remarkable results since treatment would appear to indicate that the removal of a nerve irritant, and improved occlusion, were more responsible for the improvement than the increased oxygenation also supplied, although all these three were contributing factors.

Fig. 22 shows casts made from a child at five and a half and ten years and three months of age, showing the extreme and premature mesial movement of the first permanent molar on the left side, the shortening of the first deciduous molar

FIG. 19.

Illustrating same case as Fig. 18.

at five and a half years, the absence of that first deciduous molar in the coronal time between the seventh and tenth years. The deciduous molar, owing to the double

FIG. 20.

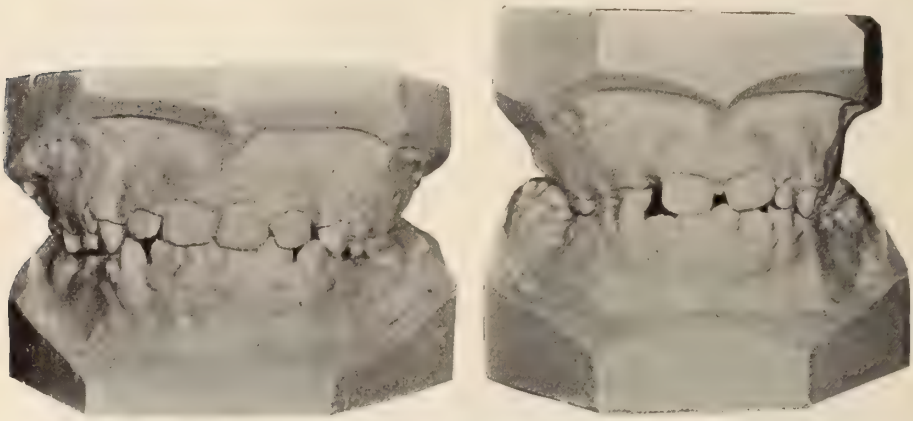
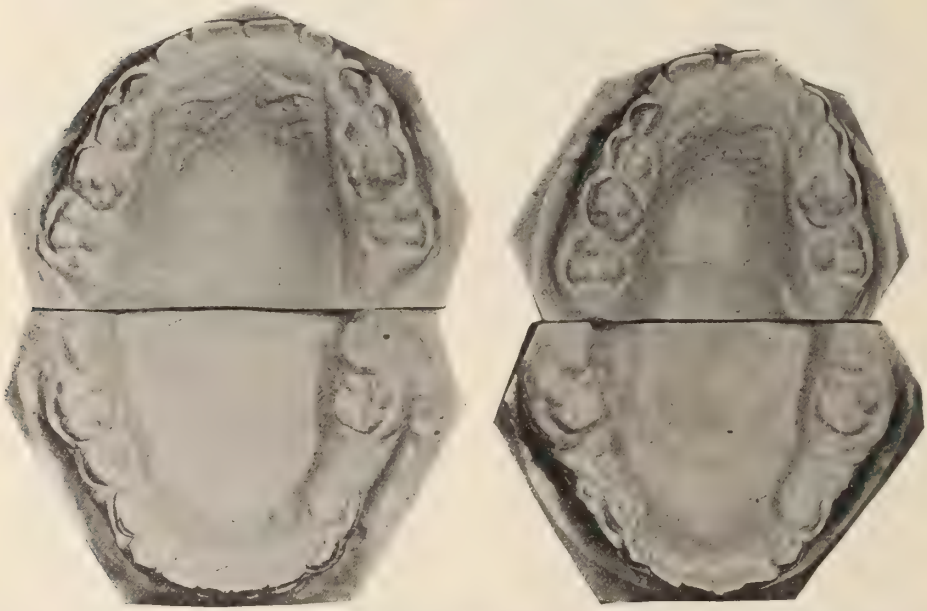


FIG. 21.



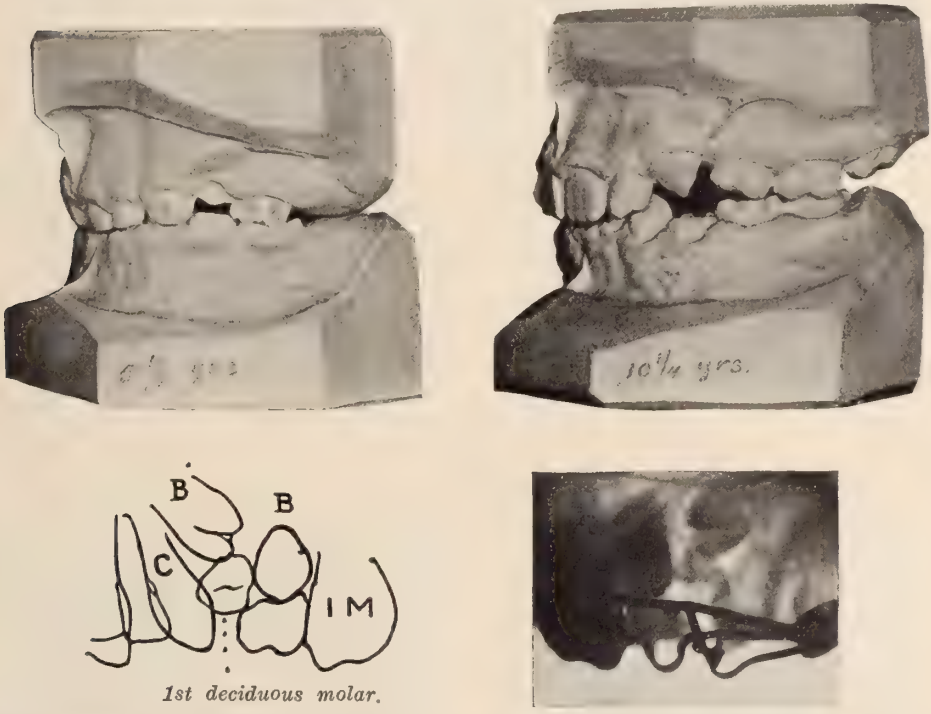
FIGS. 20 AND 21: Before and after lateral expansion, which opened the suture, then permitted anterior expansion without posterior pressures. In this case the general health improved greatly, nervousness and indigestion disappearing.

arch at ten years. The radiograph shows that the first deciduous molar had disappeared into the gums and alveolus some pressure from the prematurely erupting canine and the second molar, has been forced up, and in turn forces up the first

bicuspid. The child was wild, irritable, extremely nervous, and most difficult to handle. At five and a half I had attempted to expand the arch with the single-molar anchorage appliance, but was able to accomplish only very little in the anterior region. At that time I attributed much of the nerve irritation to the dental irregularity, but could not convince the family physician, and the case was left to itself for three years. The conditions became worse, the mother and physician became satisfied that the teeth were responsible, and the child was again put under my care.

I at once applied the root-expansion appliance and opened the suture, with a little relief of the nervous irritation. This case not responding as usual, I became suspicious of the deciduous molar region, had it skiagraphed, and found the conditions as shown above. Both the deciduous molars were then extracted, with immediate relief for the patient.

FIG. 22.



Casts showing conditions in a case at five-and-a-half years and at ten-and-a-quarter years. The upper left first deciduous molar disappeared entirely within the alveolus and increased the impaction of the bicuspid.

The expansion was continued rapidly, the incisors were brought forward and together, and room was made in the coronal and apical arches for the bicuspids and canines. The canine was forced forward, and the bite opened. The child now is a most tractable patient, happy, serene, and gaining rapidly in health and weight. The nervousness is well under control.

Fig. 23 illustrates the case of a girl of

Fig. 23.

Before and after suture-opening and lateral and anterior expansion to calculated arch.

Fig. 24.

Profile and front view of same case as Fig. 23.

eleven years and two months, with large teeth and extremely small arch. Complete expansion was accomplished.

Fig. 24 shows the face of the same patient after the expansion to the theoretical limit; no undue fulness is observed. We may accept this as proof that by a rational orthodontic treatment, without posterior movement of teeth, impaction can be relieved without extraction, and still the features be left in an harmonious and refined contour. It is not a proof that all such cases may be so treated. When extraction is necessary to relieve impaction after other rational methods have proved inadequate, it is still necessary to expand to the lateral limit, in order that anterior impactions be relieved and the nasal tract enlarged.

CONCLUSIONS.

The preventive treatment for dental impaction consists in an early orthodontic operation, which must provide for the easy eruption of the permanent teeth. The operation must be made upon the deciduous teeth, and the arch should be expanded anteriorly and laterally, and not at the expense of posterior teeth.

(The possibility of creating impactions of posterior teeth was first suggested to me some eleven years ago by Dr. Henry Barnes, and I am much indebted to him for his warning. I have been further aided by Dr. M. H. Cryer, whose writings at later date have confirmed the fear of the possibility of creating impactions by the posterior movement of molars.)

Discussion.

Dr. BURT ABELL, Toledo, Ohio. We have to take off our hats to the man with an idea. Whether or not we agree with all that Dr. Barnes has said, we must recognize that he has given us the results of most painstaking investigation. He is specially to be commended for the scholarly and gentlemanly way in which he delivers his message, free from the personalities that so often mar otherwise valuable papers and discussions.

I have one criticism to make, and at least one question to raise. Without close attention to the text of the paper, we are left to infer that Dr. Barnes has no use whatever for the alignment arch and horizontal tubes, while in fact, in his own practice, he follows his preliminary work of opening the suture with this very same alignment arch.

The question I would raise and would ask Dr. Barnes to answer is this—What takes place in the mandible? We have no suture there. Do not the teeth really move through the process, as when traction is applied with the alignment arch and ligatures? If so, the advantage would lie simply in the control of the apical arch when the apparatus recommended by him is used on the mandible.

We have no reason to believe that the size of the teeth is in any way affected by prenatal or postnatal conditions of nutrition or malnutrition, neither are we warranted in saying that heredity plays a determining part in their size, except that they seem to bear a definite relation to the *general type* of the individual. With the jaw itself it is different. Here malnutrition, either prenatal or postnatal or both, lack of vim—for want of a better word—giving rise to adenoids and the consequent train of habits, etc., all leave their imprint on the size of the jaw. Given a condition in which the teeth of the size normal for that particular individual are endeavoring to erupt into a poorly nourished or undeveloped jaw, we have a crowding together which causes a reac-

tion in the deeper tissues, a condition which our essayist has been pleased to call impaction. I firmly believe it is here and here only that we may look for so-called hereditary manifestations of malocclusion. With the definite malpositions of the teeth, heredity plays no part. The child inherits a certain type of feature, a certain tendency to early maturity or a lack of tone or vim, all having an effect on the size and shape of the jaw, with consequent lack of room for the erupting teeth. These deciduous sets, which the parents tell us were "just perfectly beautiful, so regular and close together," to the orthodontist are sure evidence of the lack of the continued growth of the jaws, and are a sure harbinger of impaction later. Dr. Barnes has been preaching for years the need of the interdental space in deciduous sets. Judging by the numerous reports that come to us orthodontists through the parents, of advice given by dentists to let the malocclusion alone until all the permanent teeth have erupted, we would conclude that it is not generally known among dentists that the normal growth of the jaws stops at about the eighth year and, if there is to be a *normal* stimulation of bone development without a break, the treatment must be begun before that age.

In March Dr. Barnes gave me a hint of the subject-matter of his paper, and showed me in his office a great many of his cases in different stages of treatment. I was particularly impressed by the perfect palatal arches and also by his perfect control of the apical arch. I became convinced that he was working along a practical and rational line, and since that I have put eleven cases under treatment in which I judged that his plan was indicated. I realize that the time has been too short to fully demonstrate the value of the essayist's methods so far as these individual cases are concerned, but I find that I have been able to expand the arches laterally with no tilting of the molars or bicuspids, which almost invariably occurred in expansion with the horizontal tube and alignment arch.

Within the last month I have had an opportunity to prove Dr. Barnes' statements as to the nervous effects of these impactions and their relief by the orthodontic treatment he recommends. Sherwood S., ten years of age, presented with a class I case of malocclusion—Angle's classification—with the arches so shortened that there was absolute approximation of the upper first bicuspid and laterals. The upper canines were nearly ready to erupt labially to the laterals and there was a very marked constriction of the arches linguo-buccally. The boy was as near perpetual motion as a boy could be, twitching the face, throwing out the chin with a peculiar stretching of the neck muscles, making queer noises with the nose, etc., his health was delicate, his appetite poor. I adjusted an appliance according to Dr. Barnes' plan and opened the suture rapidly for four weeks. Last week the mother presented the boy, being perfectly delighted that nearly all his nervous habits had disappeared, and the general health and appetite were so much improved that he hardly seemed to be the same child.

I am thoroughly convinced that expansion by opening the suture is the normal and logical way—that it is not only another way of accomplishing our aim, but marks a step in advance that we shall all have to recognize and adopt in our practice. Whether we employ the appliance that Dr. Barnes uses, or some other method, is another matter. As far as I have been able to see, he has evolved a

very efficient but somewhat cumbersome set of wires, vertical tubes, bands, etc., which, if used intelligently, will produce the desired result. I have found by experience, however, that it is not foolproof, and that it must be used carefully.

Our only alternative with the single molar anchorage and horizontal tube when we wish to enlarge the apical arch, is to wait for nature to fill out the bone tissues within from two to three years, which, however, she sometimes neglects to do. If the only benefit to be derived from using Dr. Barnes' appliance is the control of the apical arch, it would be well worth using, *when indicated.*

Dr. Barnes' contention regarding the intermaxillary anchorage is one of vital importance, and presents two phases. Under certain conditions it answers the requirements perfectly. Our trouble in a great measure has been its misuse. We have known nothing to take its place, and have had to use it in all cases of classes II and III. We have felt the need of anchorage outside the oral cavity, or one at least that did not jeopard the position of the teeth in the opposite jaw, but none of us seemed to be able to develop one, and it was Dr. Barnes who suggested the face-mask. I have two cases in which I am using it. In one of these, neither jaw had developed mesially sufficiently to impart an harmonious outline to the features.

I could do no more than put the teeth in normal occlusion without some point of anchorage outside the oral cavity, as this did not sufficiently fill out the face, so I began the use of the face-mask at night, and have been able to produce a much better facial outline.

Though I have yet to demonstrate it to my satisfaction, I believe that a great deal of our difficulty in retention is due to the disturbance posteriorly of our anchor teeth, particularly the upper first molars. Impaction of the second and third permanent molars results, their efforts to erupt disturbing all our previous efforts at correction. I cannot emphasize too strongly that we should never move posteriorly a tooth which by such movement will encroach upon a space belonging to a tooth yet unerupted. We have not planned largely enough nor looked deeply enough into our cases. I am most happy that Dr. Barnes has given us a jolt and compelled our attention in the matter of impactions. True orthodontia is preventive. It should be concerned with appliances only as a means to an end. To be preventive it must work with the young, and I predict that the day will come when practitioners will look upon the present-day methods and practices much as we, in our self-conceit, look upon the attempts of the men of long ago who merely "straightened teeth"—and the upper incisors and canines at that—methods which served their time as stepping-stones, but are to be outlived and left behind for better things.

The whole world is waking up to the value of the humanitarian work among the school children as a preventive measure. As progressive men, let this idea of early treatment for the relief of impactions get a grip on our very souls, remembering that we are just on a ledge of the mountain of progress and not at the top. Let us not look back and down into the valley of past struggles through the mist of mistakes, but turn our faces upward toward the top as a safer, better procedure, and one worthy of men.

Dr. S. M. WEEKS, Philadelphia, Pa. I wish to pay my respects to the essayist for his unusually well-written paper. The

facts are so clearly stated and the premises so well chosen as to leave no particle of doubt as to their intended meaning.

This paper contains much food for thought and investigation along many lines; one or two particularly appeal to me, and to these I would direct your attention for a short period.

The essayist mentions certain prenatal and postnatal factors which influence dentition. I do not disagree with these facts, but I feel that he should have continued, and considered the effect of insufficient use of the dental organs upon the development of the permanent arch. I believe it to be an undisputed fact that the uncivilized races have a very small percentage of irregular teeth, and we know that the amount of use given to the teeth in the preparation of the food for assimilation is far in excess of that given by civilized people; the greater the amount of culture, the relatively smaller is the amount of work required to prepare the food—and the proportionately greater is the amount of tooth impaction.

This, I believe, should be a factor in our consideration of impactions, and an equally important phase of our treatment, inasmuch as it would indicate the development of such customs in food selection and preparation as would favor those requiring a much greater amount of mastication, this training to be applied to the individual as soon as he is permitted the use of solid foods.

The matter of "orthodontic pressure improperly applied" opens for discussion a very large field, and one which I cannot let pass without observation.

In the early years of their practice, practitioners are apt to follow blindly principles and methods which produce results that become nightmares when subjected to the test of years. This I believe holds true also of some of the teachings which many are following at the present time, and which have been referred to by the essayist.

In the treatment of impactions one principle should stand out above all others, namely, that assistance be rendered early, and the cause and progressive development in the wrong direction be averted as early as possible. This means that the greater part of the work of the orthodontist in the future should be done upon the deciduous teeth.

The action of the expansion arch upon the permanent teeth as ordinarily understood was bad enough, owing to its effect of contracting the apical arch, but when used upon the deciduous teeth it became a travesty upon good judgment. The essayist pointed out how its action produced an arch placed too far posteriorly in the skull, and thereby caused impactions of the second and third molars. I have seen this expressed in the result of the treatment of many cases where there was an evident tilting backward of the first molars.

I believe that this condition will be more generally recognized when enough time has elapsed to enable us to become convinced of actual impactions.

Again, when an appliance of this character is used upon the deciduous teeth for purposes of expansion, it may produce exactly the opposite effect, inasmuch as it contracts the arch represented by the apices of the roots of the deciduous teeth, and thereby causes a contraction of the developing permanent arch in *all* directions.

I should like to add in passing that, while not disagreeing with the essayist's views as to the early completion of the

lateral development of the arch, I believe a more careful consideration of that point will be beneficial.

I have used for a number of years the plan of determining the proportions of the arch as outlined by the essayist, and find it productive of very satisfying results; but in my opinion it is not practical to depend upon the X ray for determining the dimensions of the anterior permanent teeth, however desirable it be. An X-ray photograph is subject to too many factors of error. In my belief we have scarcely begun to realize the far-reaching effects of impactions upon the nervous system, and while it is difficult to furnish proofs, yet I have noted so many cases where there was an evident improvement of nervous conditions during the progress of and following orthodontic treatment that I am in sympathy with the essayist's view on that phase of the subject.

In closing, I would like to say that it would add much to our understanding of some of the vital features of the essayist's paper could we be more certain of the manner in which bone growth actually takes place in cases subjected to arrested development and subsequent artificial stimulation.

Dr. Robert H. W. Strang, Bridgeport, Conn. I wish to congratulate Dr. Barnes on the results of his treatment in the cases shown.

The fundamental thought upon which the essayist has based his paper is one that will bear a great deal of emphasizing, for its importance has certainly been underestimated. Pressure exerted at a critical period in a child's life on one of the largest of the cranial nerves must be productive of reflex phenomena of a serious nature, as has been clearly demonstrated to us clinically. A third molar unable to force its way to its normal position may give rise to symptoms manifested anywhere in the body. What must be expected, then, if several teeth intimately related to the nerve attempt to push their way into a greatly underdeveloped arch, and are obliged eventually to assume a position of mal-eruption necessarily associated with continued pressure!

That such a condition can be prevented is a fact no longer questioned. One of the greatest triumphs of modern orthodontia lies in the fact that it is no longer a specialty for the correction of malocclusion alone, but also for its prevention. The problem is one of assisting nature in building up enough bone to accommodate the permanent teeth as they erupt.

The essayist has laid great stress upon the necessity of producing sufficient lateral development. This necessity is not to be questioned, and when sufficient lateral space is obtained, the permanent incisors will be able to erupt in good alignment. Normally, beginning with their eruption, there should be a distinct forward growth in the region of the premaxilla and the lower incisors to afford room for the permanent canines. According to my experience in such cases of retarded development this forward growth does not occur even after the lateral growth has been produced by artificial stimulation. This means that our work of prevention is not completed when we have produced sufficient lateral development. We must also stimulate the normal forward growth of the incisors after their eruption. It may have been noted that Dr. Barnes mentioned the necessity of carrying the incisors forward in the treatment of several of his cases, but I

feel that he should have laid greater stress upon this item when speaking of prevention.

With these two main thoughts of the essay, *i.e.* the liability to dangerous pressure symptoms from impaction, and the possibility of preventing impaction, I thoroughly agree. There are, however, some minor theories, upon which Dr. Barnes has based many of his deductions, that I would question decidedly.

I am unable to comprehend Dr. Barnes' reasoning that, because the mother's milk fails to properly nourish the infant, we may know that "prenatal conditions were not correct or normal," and that "therefore prenatal development must be more or less deficient."

The nutrition of the child *in utero* after the third month is taken care of by the placenta. There is no direct connection between the child's blood and that of the mother. The placental villi assume charge of the selection of the proper food materials and of the oxygenation of the blood. The phenomenon of the mammary glands of the mother failing to select and produce proper nourishment for the child after birth is no sign that the placental villi have not been able to do so before birth.

That artificial feeding is responsible for maxillary under-development I do not question; but I believe that another factor of greater importance must be taken into consideration than improperly modified milk. This has been expressed with great emphasis by Dr. Woods Hutchinson.

Normally the child at breast must exercise a great deal of physical force to obtain its food. The jaws are in constant motion compressing the nipple and breast; and with all this activity the food is obtained only a few drops at a time. Contrast this with the conditions present in artificial feeding. With the soft rubber nipples so commonly used the baby is able to get its food without exercising any of the muscles of mastication, and consequently bone growth is not stimulated. Furthermore he obtains this food mixture by the mouthful, and it passes on to the stomach, where it is at once converted into large masses of curd which can never be broken up and assimilated. Hence the jaws are not developed in the bottle-fed baby, primarily because they are not exercised and secondarily because the food is not assimilated.

Further, Dr. Barnes mentions heredity as producing a tendency toward inharmonious development of the bones and teeth. It is true that we know comparatively little about this subject, but certainly the knowledge that has been gained goes to prove that all the tendencies of heredity are to produce normal organisms. If this were not so, the whole world would long ago have been inhabited exclusively by freaks.

Dr. Barnes' conception of the normal development of the jaws and subsequent eruption of the permanent teeth is well and clearly stated, but his idea that lateral development of the arch is caused by a growth of bone along the median suture which forces the maxillæ apart is without scientific foundation. This lateral growth is an interstitial one, accompanying the formation of the permanent teeth within the bone and above the deciduous set. It is true that if the suture be opened and held open, new bone will form and fill in the space, but that is another process and not normal development. It is for this reason that I would contend that the methods used in preventive treatment should be such that this interstitial growth be encouraged rather

than a growth along the median suture. We should make our work conform as far as possible to nature's plan; in other words, let the pressure exerted by the appliance be strong enough to stimulate a normal interstitial bony growth, but not of sufficient power to open the suture. Nor can I see how it is possible that a whole denture erupt in a position too far posterior in its relation to the skull. Until better proof can be furnished to discredit it, I am pleased to accept the teaching that the upper first molar is one of the most stable and fixed landmarks in facial anatomy (see Angle, *Items of Interest,* June 1906).

Dr. Barnes' contention that the first permanent molar is held back because the teeth anterior to it usurp territory that should be occupied by the molar in its forward movement does not appear to be a physical possibility. This large tooth is erupted about five years before the second bicuspid, and is completely developed at the time the bicuspid is ready to take its position. Its normal time for beginning this forward movement coincides with the loss of the deciduous molars. In other words, the moment the first deciduous molar is shed the first permanent molar starts on its journey forward and continues on its way when the second deciduous molar is lost. In this movement it is forced onward by the developing second molar. If, when it has reached its normal forward position, there is still room for the bicuspid to complete its eruption all will be well, otherwise the bicuspid, weak and under-developed, will be prevented from assuming its correct position in the arch. Certainly the first molar will never wait for a bicuspid to erupt and usurp territory that does not belong to it.

In closing, I wish to quote these words of John Ruskin, which will serve us well as a motto if we are to achieve success in our chosen field:

> We are not sent into this world to do anything into which we cannot put our hearts. We have certain work to do for our bread, and that is to be done strenuously; other work to do for our delight, and that is to be done heartily; neither is to be done by halves or shifts, but with a will; and what is not worth this effort is not to be done at all.

Dr. Barnes (closing the discussion). Dr. Abell's question as to what becomes of the lower teeth in opening the suture may be partially answered by referring to Fig. 12, which shows a similar appliance for lateral and anterior expansion of the lower teeth. No suture opening takes place in the lower jaw, and the expansion is slower and more difficult to attain. The lateral expansion is first accomplished, then the anterior one. The lower teeth and arch are made to fit the upper, and in antero-posterior mal-relations of maxillary and mandibular teeth the adjustment is made with the intermaxillary or facial anchorages or with both.

I most heartily commend what Dr. Weeks has added in regard to the thorough use of the jaws and teeth in the preventive treatment. At the present time there is too much tendency to raise children on mushy foods, including milk, gruels, etc. Sweet milk, while containing all the necessary food value, is still primarily intended for the very young animal. The proper food for the infant and young animal with teeth would seem to be food that requires chewing, and this chewing is unquestionably a great factor in the proper development of the jaws and teeth. The chewing of solid food should therefore be of distinct benefit in the preventive treatment of impactions.

Dr. Weeks has accented the essential point in calling attention to the principle involved in early orthodontic treatment of the deciduous teeth, which means the prevention of impactions and irregularities before the permanent teeth appear. The X rays do not give exact dimensions, but good pictures will indicate the approximate widths from which an approximate arch may be calculated, and later corrected upon the eruption of the permanent incisors.

Dr. Strang has spoken very kindly in regard to the results shown in the several cases illustrated, but I trust that no one will take these cases to illustrate anything but the average results that I am obtaining under the principles advocated. I have laid great stress upon the lateral development required, but as these illustrations are made from average cases, it must be observed that my charts of arch expansion show the necessity of anterior and lateral expansion. Lateral expansion must be attained *first* because of the early eruption of the incisors, which require practically the entire lateral width to erupt, before they can fully take up their anterior positions.

Dr. Strang claims to be unable to comprehend that failure of the mother's milk may indicate that prenatal development was more or less deficient. I do not comprehend how one can logically reason otherwise, particularly since no less an authority than G. Stanley Hall says: "One of the earliest of the long degenerative stages which mark the decay of ethnic stock is imperfect mammary function and inability to nurse offspring sufficiently." ("Psychology of Adolescence.") What shall we say about the nutrition of the fetus *in utero* before the third month? Would it not be subject to the conditions of disease or health? And is not the failure of the mother's milk a result of disease or ill health? Surely we can only expect to raise healthy normal stock from healthy ancestors. In regard to heredity I wrote, "Heredity may produce a tendency to inharmonious development of bone and teeth," because I did not wish to befog the main ideas, but if heredity is a factor—and no one can prove that it is not—the sooner the preventive treatment is begun the better both for the teeth and for subsequent development.

The median suture is a known region of development, and that development must be lateral. Teeth assume irregular positions chiefly because of deficient fundamental bone development. If we find deficient lateral development we must conclude that at least some of that deficiency was along the suture, and the best imitation and approximation of the normal development seems to be attained by the rapid opening of the suture. In practical cases I have found that suture-opening and relief of impactive pressures in the maxilla will result in better digestion and lessened nervousness long before the slower expansion of the mandibular teeth could occur, where there is no possibility of suture opening. The expansion of the mandibular arch is necessarily more stimulative, while the maxillary expansion approximates the immediate, and is better, providing the pressures exerted range within the physiological limits. In support of suture opening and rapid expansion I should add that I have obtained better health results from these methods than from the employment of the slower so-called stimulative light pressures.

When nature has failed we must not depend upon her to yield readily to slight

stimulation, and further, children presenting such defects should be relieved as quickly as possible; there are other things in life that require some of their attention and time.

If my effort has shown the relation between impactions and dental irregularity and suggested a rational preventive treatment therefor, I shall feel amply repaid for a great expenditure of time and energy. The discussions have been excellent, and I wish to thank the speakers for their careful, thoughtful consideration of what I believe to be a new and necessary form of orthodontic treatment.

Dr. RICH. Before adjourning the section, I wish to take this opportunity to give public recognition to the work of Dr. Gray, vice-chairman of the section. Although he was unable to be present at this meeting, Dr. Gray has done good work in arranging our program.

Section I then adjourned until the next annual meeting.

SECTION II:

Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

Chairman—L. L. BARBER, Toledo, Ohio.
Vice-chairman—FRANK I. SHAW, Seattle, Wash.
Secretary—JOSEPH HEAD, Philadelphia, Pa.

WEDNESDAY—July 26th.

The first session of Section II of the National Dental Association was held at 2 P.M., Wednesday, July 26th, Dr. L. L. Barber, Toledo, Ohio, chairman, presiding.

The first order of business, as announced by the chairman, was the reading of a paper by Dr. C. N. JOHNSON, Chicago, Ill., entitled "Mistakes, Common and Uncommon," as follows:

Mistakes, Common and Uncommon.

By C. N. JOHNSON, M.A., L.D.S., D.D.S., Chicago, Ill.

AT the outset I wish to subscribe to the acknowledgment that "To err is human," and so I wish it to be understood that in regard to the mistakes to which I call attention, this is not done in a mere spirit of criticism. I am too conscious of the many of which I myself am guilty to have the courage to take to task others who make mistakes. But if we recognize the fact that we are often on the wrong side of a matter, it may help us in solving the problem of getting on the right side—and so it may not be always unavailing to point out our mistakes.

In the practice of a profession the pursuit of which involves so much of a technical nature, and in which techniques are necessarily changing constantly to keep pace with advancing methods, it is not strange that mistakes should occur in the evolution from one method to another. We must have charity for the man who, in groping after better things, must needs

stumble and fall many times before he at last reaches solid footing. If men took no chances of mistakes there would be little progress, and yet there comes a time when it is necessary to pause and take stock of our progress, and see if we are not making more errors than necessary.

TAPE, WOODEN POINTS, AND MASSAGE IN POLISHING TEETH.

One of the mistakes which recently has crept into the practice of some dentists consists in poor judgment in the manipulation of tape between teeth in polishing their approximal surfaces during prophylactic treatment. The loading of tape with pumice or other abrasive material and sawing it back and forth in the interproximal spaces produces more harm than good. Aside from unnecessarily lacerating the gum tissue and tearing away the delicate attachment of the pericemental membrane from the circumference of the root, this procedure frequently results in extreme sensitiveness of the necks of the teeth, and brings about a worse condition than the one which it was intended to cure. The extreme to which some operators have gone in this use of tape was probably never conceived of by the man who first suggested oral prophylaxis, and he of all others would be most urgent in calling a halt to such practice.

In passing, it may be said that when smoothing and polishing the surfaces of teeth under the free margins of the gums the delicate and tapered wooden points carried in holders, as suggested by Dr. D. D. Smith, are ample to produce a smooth surface to the tooth, and if carefully used these points may be carried into pockets under the gum without undue laceration or injury. This may require a little longer than the use of tape, but it is better to take extra time during the operation than to be obliged to utilize this time in explaining to the patient why the teeth are so sensitive after treatment.

Gentle massage is beneficial and stimulating to the gums, but they will not tolerate the laceration and abuse frequently inflicted upon them through the careless use of finishing strips in polishing fillings in approximal surfaces. We have frequently been warned against this kind of injury, and now we are practicing the same kind of damage under the guise of oral prophylactic treatment. This mistake should be remedied at once, otherwise our patients will develop a prejudice against prophylaxis on account of the resultant sensitiveness, and will refuse to submit to this treatment even when the indications are imperatively in its favor.

CROWNS AND GUM IRRITATION.

Another mistake, which happens so frequently as to be classed as a most common one, is the practice of cutting off natural teeth and substituting artificial crowns in cases where such a procedure is entirely unnecessary. Many a natural tooth has been sacrificed to this mania for crowning, and much criticism and severe censure has been meted out to the profession for this practice. It has been taken for granted that this practice was due to selfish motives and not to mistaken judgment. In some instances this is probably true, but I prefer to believe that in very many cases the operator honestly thinks that he can make a more permanent operation by crowning than by filling. This fallacy in regard to the longest service of the tooth needs only to be pointed out to be recognized. Granted that the natural crown of a tooth is somewhat extensively decayed, and that a

filling operation cannot be expected to last many years, it is safe to say that the condition of the gum around the tooth will be better during the few years that the filling lasts than if a crown had been applied. If a crown must eventually be used, the operator, by first filling the tooth, has gained for his patient the service from the tooth for just the number of years that intervene between the filling and the crowning, because the tooth will ordinarily last as long from the time when it was crowned in the second instance as it would have lasted had it been crowned in the first instance.

The question of gum irritation is becoming a more and more important one as we note the number of teeth that are lost annually by the process of loosening, so much so that a general plea is being made in the profession for a bandless crown wherever it can be employed. It is being recognized quite commonly that bands irritate in most cases, even if they have been carefully fitted, therefore the longer we refrain from applying bands to the teeth, other things being equal, the better chance we have of preserving the gums in a healthy condition. This seems more significant owing to the fact that most cases of needless crowning involve molars and bicuspids, the natural tooth being simply ground down on the sides and a shell gold crown being telescoped over, thus introducing all of the disadvantages of the band, which is frequently far from fitting perfectly.

In the days when large restorations by filling had to be made with gold foil if they were made with gold at all, there was some semblance of justification for crowning for those operators who had little confidence in amalgam, and yet it may unreservedly be stated that a well-made amalgam restoration is far preferable to immediate crowning in many such cases. The advent of the gold inlay, however, has left not the slightest ground for the over-enthusiastic crown worker to stand on. We can make restorations now which would have been ill-advised if made by the gold foil method, and there is absolutely no question as to the promise of better service from a good inlay as compared with a crown.

If we study carefully the tendency of the times in regard to the loss of the human teeth, we note that an increasingly large number of teeth are lost by failure of the surrounding tissues rather than through extensive caries of the teeth themselves; therefore, in justice to our patients, we should aim to keep the tissues healthy. From this point of view it is something more than a mere mistake if we persist in performing operations the nature of which jeopards the integrity of the supporting tissues, while other available operations would be equally effective and devoid of this disadvantage.

CONTACT POINTS.

While speaking about injuries of the gum tissue through faulty operations, another mistake comes to mind which requires special emphasis, although it had been pointed out so frequently that any reference to it at this time would seem unnecessary. Yet the fact that its importance is so generally disregarded renders it desirable to raise the strongest possible objection on every suitable occasion. This mistake consists in faulty contact points on the approximal surfaces of fillings and crowns, which result not merely in immediate discomfort caused by food wedging between the teeth, but in permanent injury to the tissues that fill the interproximal space, and in the creation

of pyorrhea pockets which ultimately cause the loss of the teeth. It is not necessary on this occasion to consider the normal form and function of the contact point, but attention should be called as urgently as possible to the grave mistake which many practitioners are making in their daily practice by ignoring this important matter. No one thing connected with the operation of filling teeth, aside from the fundamental essential of arresting the carious process, is of greater consequence to the future serviceability of the tooth than this necessity of establishing and maintaining good contact; and of all the commendable qualities which have been enumerated in favor of the gold inlay, none is of greater consequence than the fact that by its use in cavities involving the approximal surfaces good contact points may be more easily made and maintained than by any other kind of filling operation.

ROOT-CANAL FILLING.

Another mistake to which I wish to refer is like the proverbial two-edged sword; it is the much-mooted question of filling root-canals. I am about to make an unusual plea in connection with this operation. Ever since I have read dental literature I have seen emphasized the direful results of not getting the root-filling to the apex. Skiagraphs have repeatedly been made showing imperfectly filled roots, and the performers of these operations have been held up to scorn for their faulty technique. It is true that much imperfect work has been done in this particular, and it should be our aim to reach the apex of the root as accurately as possible, so that the canal is obliterated and the ingress of bacteria prevented. We should try to seal the apical opening, but this is much more easily said than done, and in the blind attempt to do this in every case it is questionable whether more harm is not being done than good. The vision of the skiagraph before the operator sometimes leads him to injudicious attempts at enlarging the canals and reaching the apex when this is not practicable. Some canals have curves which defy man's ingenuity in negotiating with an instrument, and it is folly to attempt this by any mechanical reaming process.

Reaming. This does not imply that a canal drill is never indicated. Frequently a slight constriction of the canal is found just rootwise of the point at which it leaves the pulp-chamber, and this orifice should in many instances be reamed out to admit of better access to the canal, and to show the direction which it takes, but advancing the drill any distance into the canal means inviting disaster. The use of sulfuric acid as introduced by Dr. Callahan of Cincinnati is probably the safest method ever suggested, and yet there are cases of curvature of the canal where it is impossible to work the acid with a broach. Fortunately for the operator and the patient this curve is usually situated near the apex, where the canal is small, or it is present in roots the canals of which are not large enough to contain much deleterious matter. Otherwise there would be more abscesses following attempts at filling these canals.

Perforation. What I wish to emphasize most strongly is the mistake too frequently made of drilling through the wall of the root in an effort to enlarge the canal, and the projection of the filling material beyond the apex. Painstaking efforts at cleansing all canals are commendable, and, as has been said, we should try faithfully to reach and seal the apex with the filling, but considering

the curvature present in most roots and the difficulty of access through carious cavities, it is dangerous to insert a drill or reamer any distance into a canal, as it is also unwise to exert too great pressure in forcing the filling material to place.

FORCING THE ROOT-CANAL FILLING BEYOND THE APEX.

Skiagraphs show other mistakes besides unfilled canals, and copper wires and gutta-percha points projecting beyond the apical ends of roots have too frequently shown the unwise zeal of operators. Even when alveolar abscesses do not occur as a consequence of these projecting root-fillings, usually an irritation is set up that leads to an otherwise unaccountable lameness of the tooth, which would never have occurred if the filling had not been forced beyond the canal. It seems to me injudicious to aim invariably at a certain symptom which has been often cited by operators as a guide to root-filling. We have been taught to force the filling till the patient flinches slightly, which is supposed to be an infallible guide indicating when the filling has reached the apex. This, however, is not a true guide, nor is it a safe symptom. The patient may flinch long before the filling reaches the apex, owing to the condensation of air under the filling, or on the other hand, there may be no sensation even when the filling is forced beyond the canal. This is especially true when the pulp has been removed by pressure anesthesia and the canal is filled at the same sitting. A tooth from which the pulp has been removed by pressure anesthesia should seldom be filled until the apical tissues have had time to recover their normal sensitivity.

Mummifying agents. In no department of our work are good judgment and painstaking manipulation more urgently called for than in the filling of root-canals, and in a careful observation of this operation as made by conscientious practitioners I have been impressed with the harm that has been unwittingly done by irritation of the tissues beyond the root through over-zealous attempts at filling the canals perfectly. By this statement I have, of course, no reference to the numberless instances where practitioners do not make any reasonable effort to get into the canals at all, but pin their faith to mummifiers and drugs rather than to honest mechanical procedures. In our profession too much dependence is often placed upon drugs to do what should be achieved by manipulative means, and the patients suffer as a consequence. It may be permissible under certain circumstances to seal in a pulp chamber and root-canal some one of these so-called mummifying agents for temporary purposes till the tooth recovers from a chronic soreness, but no dependence should be placed upon them for permanent work. Just to the extent that we depend upon drugs to do the work which legitimately should be accomplished by manipulative effort, do we jeopard the interests of the patients and lower our efficiency.

MOUTH-WASHES.

In this connection attention should be called to another mistake which the profession is fostering, namely, the constant use of mouth-washes among our patients, irrespective of whether they are indicated or not. I am far from condemning the legitimate use of carefully prepared stimulating and antiseptic solutions in those cases where the abnormal conditions of the mouth indicate such treatment,

but mouth-washes should be limited to their proper indications, and should be eliminated from use in healthy mouths, as their use in the latter has a tendency to do more harm than good. If the mouth is healthy, there is always a danger of disturbing the normal balance by the introduction of agents which tend to interfere with function. The maintenance of function is the surest way to health, and consequently the healthiest mouth is the one in which function is most fully performed. The best stimulant for the gum tissue and the best polisher of enamel is the friction of food in the function of mastication, but unfortunately mastication is not always carried out to its fullest efficiency. We use toothbrushes to make up this dereliction, but the moment we begin to depend upon solutions and washes to do the work which should be done mechanically by mastication and the brush, the tissues begin to deteriorate. I am not arguing against the use of a wash in inflammations of the tissues and puffed and swollen gums, nor am I criticizing, as some have done, the mouth-washes which are on the market today, many of which seem to be carefully compounded, but I venture to suggest that if the patient could be prevailed upon to have removed from his teeth all irritating deposits, and his gums properly stimulated by massage and the friction of food and the brush, restoration to health would be just as certain as by the use of drugs, and it would be more permanent. But just here is the rub! It seems so difficult to induce the average individual to properly care for the teeth and gums by mechanical means unless some powder, paste, or wash is prescribed as an incentive. In this particular respect these agents have been useful; they have been the means of inducing many negligent individuals to take care of their mouths, which otherwise would have been neglected. Most of the dentifrices are prepared with a pleasant flavor, and they impart to the mouth a refreshed and wholesome feeling which the patients highly appreciate.

The whole tendency of our teaching should be in the direction of preserving the normal balance between function and health rather than glossing over any pathological conditions by a false reliance on drugs. This is too much akin to the habit of using powerful and not always pleasant perfumes as a substitute for good, honest cleanliness of person.

The individual who carries with him the cleanliness of the bath has little need for musk, and he whose teeth and mouth are kept constantly clean is seldom obliged to resort to the "doping" of drugs.

Discussion.

Dr. J. R. Callahan, Cincinnati, Ohio. I feel it a great honor to have been chosen to discuss a paper written by Dr. Johnson, who occupies so high a position in our profession.

In regard to root-canal treatment, I agree with the essayist so fully that, if we were to be called to the chair to operate upon the same case, it is likely that our agreement would be more apparent than when we attempt to put our ideas in writing.

"Just to the extent that we depend upon drugs to do the work which legitimately should be accomplished by manipulative effort, just to that extent do we jeopard the interests of the patients and lower our efficiency." In this declaration Dr. Johnson has made a terse statement of a great truth. I wish the above quotation could be so impressed

upon the minds of the profession that it might not be for a moment forgotten. Chemical assistance is indicated, however, in many cases in the removal of dead and diseased tissue and in opening root-canals for drainage and access. Twenty years' experience has proved to me most conclusively that sulfuric acid in forty per cent. solution is a most valuable assistant in opening and smoothing root-canals, and when carbonic acid is liberated within the root-canal by the union of sulfuric acid and sodium bicarbonate solution, the canal is at once rendered clean, surgically clean.

Schreier's sodium-potassium is at times an invaluable adjunct; fine threads of diseased tissue can often be removed from the canal by the proper manipulation of this agent.

The text-books in use in our colleges in my opinion do not give as clear an idea of the use of either of the above chemical assistants as might be desirable. In my opinion, not one of the ready-made, much-advertised root-canal filling materials is nearly as safe as the old-fashioned chloro-percha and gutta-percha cone fillings.

Even this method is open to very serious objection. For several years I have been endeavoring to produce a more satisfactory root-canal filling, and this desire and effort has not been entirely in vain. I desire to call your attention to the following procedure: A piece of rosin such as the violinist uses on his bow is procured and a solution of chloroform and rosin is prepared, about three parts chloroform to one part of rosin. The solution should be quite thin. To a portion of this solution No. 1, as much pink gutta-percha is added as will make the solution of about the consistence of chloro-percha as generally used, this solution to be No. 2. The root-canal is dehydrated in the usual way, using chloroform instead of alcohol, dried thoroughly, and then solution No. 1 is pumped into the canal, and allowed to remain a few minutes. The dentin will thereby be saturated with rosin. Then, with sterile paper points any surplus solution is removed from the canal, which is then filled with solution No. 2. The gutta-percha cone is gently pressed to place, warmed after it is in the root-canal with hot air, and then packed in the canal with a cold instrument.

A tooth treated in this manner out of the mouth and made into a thinly ground slide will show that the tubuli are filled to the cementum with rosin. The canal is filled with rosin and gutta-percha, a mixture that is hard and insoluble in body fluids, does not shrink, and is as compatible with the surrounding tissue as is chloro-percha.

I do not believe it will be a mistake to give some attention to this suggestion.

The most serious mistake that I have noted in any and every walk of life, not only in the dental profession, is the failure or inability on the part of many people to profit by their own mistakes. I know of people who tell of their mistakes as jokes, and laugh at what they seem to think funny. Such people, as far as my observation goes, are failures. The serious study of mistakes is one of the underlying causes of the wonderful progress of the world.

The great art and science of medicine and surgery has been evolved with infinite labor and patience from a mass of mistakes that is appalling to contemplate. Beginning with biblical history, the word brain does not occur in the Bible. The ancient Hebrews believed the heart to be the seat of the soul, while the mind, in

their opinion, was located in the kidneys, and all tender emotions were in the bowels. Hippocrates spoke of the brain as a gland, and the supporters of this theory attempted to represent the brain secretion as a subtle fluid which they termed "animal spirits."

Descartes taught that the left ventricle of the heart separated these animal spirits which had been generated in the brain, distilled them out of the blood into a very living and very pure flame, and then distributed them through the arteries. These animal spirits, therefore, were made to account for everything normal and abnormal. Hence it was from noxious vapors and humors that every variety of bodily disorders took its rise.

Under date of 1618 Hilkiah Crooke, in his work on "Anatomy and Physiology," says that one great office of the hairs of the head is to lead off the vapors which otherwise would choke the brains and make them smoky. As to the condition of the brain of the bald-headed man, we may draw our own conclusions! The growth and development of a science and the mental growth and development of an individual are based on the same fundamental principles. The evolution of medicine and surgery strongly argues for the great advantages to be derived from giving serious attention to our own personal mistakes, whether they be common or uncommon.

Another common mistake made by dentists is the effort day after day to work at the chair in a state of fatigue, or frequently in a condition bordering on exhaustion.

Scientific research has demonstrated that the resting brain and nerve cells show large and well-rounded nuclei; exhausted brain and nerve cells of the same order show shrunken, irregular nuclei, while in extreme fatigue cerebral anemia is produced.

Professor Mosso, in his work on Fatigue, says: "I exposed the brains of four dead pigeons which had made the journey from Bologna to Turin, and compared them with those of the normal birds. The difference in color was so apparent that everyone in the laboratory observed it; in the fatigued birds the brain was pale, almost bloodless. This fact probably explains why the quails on their arrival from Africa do not see so well as usual, and why we ourselves are incapable of doing brain-work after great fatigue."

Adam's "Pathology" tells us: "It is a familiar experience clinically that overwork favors infection; that those engaged in hard work with long hours and inadequate periods of rest are apt to succumb to tuberculosis, pneumonia, influenza, intestinal infections, etc.

"The sense of fatigue is due to the accumulation of the products of muscle activity in the circulating blood and the action of the same on the higher centers."

In the state of daily fatigue it is impossible for a dentist to do justice to his work or to himself, and it is a serious mistake for him to neglect the great specific, namely, rational out-of-door exercise and wholesome rest.

Dr. F. W. Low, Buffalo, N. Y. I should not attempt to discuss this paper but for the fact that those appointed to discuss it are absent.

Before entering into the discussion I trust you will pardon me for telling you one or two stories suggested by the picture on the stage to which you have given the place of honor. Thirty-five years ago I was a first-year student in the New York College of Dentistry, in which Dr. Atkinson was a lecturer. At that time

Dr. Atkinson used to deliver his lectures with his coat off. He was accustomed to say that he knew his boys so well that it would not disconcert him to be asked questions in the midst of his lecture, and if there was anything we did not understand or believe, he wanted us to hold up our hands until his attention was attracted. Thus when he said that we should use a drill in the root-canal until we had penetrated, or at least had opened into the apical foramen, my hand went up, for that seemed to me a difficult procedure for a young man intending to go into practice, in fact for anyone. I asked Dr. Atkinson how we were to know just exactly when we had penetrated the end of the apex. "Why," he said, "in boring into a pumpkin with a gimlet, when you get through the rind, the gimlet would take a little start, would it not?" That was a mistake, yet I commenced to fill teeth that way. Dr. Atkinson also taught to use a barbed broach in the root-canal until a little drop of blood appeared on the end of the broach, indicating that it had advanced far enough. I used to try to fill pulpless teeth for a dollar and a half, and I think my success in those cases was due more to the drop of blood than anything else I did for that remuneration. I soon came to the conclusion that it would be just as well to allow nature to do a part of this work.

Some years afterward I read before the union meeting of the Seventh and Eighth District Societies an essay on phagocytosis, as the result of some experimental work. I made these experiments upon a washerwoman, promising her that after the experiment I would remove the offending teeth and make her an artificial denture. In a central incisor that had been dead for some time, without using any antiseptics whatever, I cleansed the root mechanically, sealing it with gutta-percha—as at that time chloropercha was not being used—trying to see if nature could take care of itself. The woman suffered no discomfort for a month, and at the end of the month I extracted the tooth, split it open in such a manner as to expose the gutta-percha and the root-canal, immersed the pieces in agar-agar culture, and no bacterial formation resulted, showing that during the three weeks or more which the tooth remained in the mouth, if I had left any living micro-organisms at the apex or about the apical space, the phagocytes had disposed of them. So I came to the conclusion that this operation, so difficult to accomplish, is taken care of by nature if given a chance, and I have become more and more convinced of this through skiagraphs, which show many more cases that have been over-treated than those which have been under-treated.

At the joint meeting of the Fifth District and the Jefferson County Dental Societies held in Watertown, New York, last fall, I read a paper entitled "The Most Essential Constituent to a Good Mouth-wash." One of the members, knowing that I had made extensive experiments with potassium sulfocyanate, had written to ask if it would not be feasible to incorporate that drug in a mouth-wash. In answer to that question I wrote that paper. In the closing sentence I said: "The most essential ingredient for a good mouth-wash is good wet water"—and I believe this can be substantiated today. I have never listened to a paper with more pleasure than the one just read by Dr. Johnson.

Dr. S. C. G. Watkins, Mont Clair, N. J. I do not like to have the subject passed without saying a word at least. While I agree with Dr. Johnson in nearly

every respect, I would take exception to the disuse of the drill. The essayist was very emphatic in saying that the use of the drill is never indicated. I cannot agree with him in that statement, as I believe the use of the Gates-Glidden drill in canals to be always indicated. I do not mean that we can always reach the apex, but we should open up the canals as far as we can without danger, that is one-half, two-thirds, or three-fourths of their length. By that procedure we shall far more likely reach the proximity of the apex than if we did not open the canal with the drill. Dr. Callahan's method of using sulfuric acid can then be used much more easily. After the canal is enlarged and cleansed, it is much easier to make a perfect filling all the way to the apex.

Dr. W. M. Clawson, Cincinnati, Ohio. I have used root-canal drills for a number of years with excellent results. For the Gates-Glidden drill I do not have as much use as for the Beutelrock drills. As made today these will break at the shank when they break at all, and can then be easily removed, so that the danger of breaking them in the canal is minimal. If a root-canal can be entered easily with a root-canal drill, the latter is not needed, but it is of value in canals that are so small that they cannot be entered, and then it is advisable to use the smallest size made. No force should be exerted in driving the drill into the canal, but it should be manipulated as delicately as an instrument in surgery of the eye. By gradually advancing and receding without applying force, simply allowing the drill to follow the canal, it can be opened with care and patience to the end of the root, and any abscess can then be treated, unless the canal is extremely tortuous. Many practitioners do not seem to consider the breaking off of a broach as a serious matter, yet they regard the breaking of a drill as terrible. I would rather have a root-canal drill break than to have to tie a string to my broaches to keep patients from swallowing them.

Dr. F. A. Ballachey, Buffalo, N. Y. If any of the members present are engaged more or less exclusively in prophylactic work, I should like to have them discuss the question of tape, as I understand that this is used a great deal.

The question as to whether it is advisable for everybody to use mouth-washes and dentifrices, regardless of whether their mouths are in a bad condition or not, deserves extensive discussion. The public is learning to use these preparations because they are being widely advertised, yet by no means through the dental profession alone. I usually advise patients in regard to the use of dentifrices that it is best to clean the mouth with water and brush first. Then the tooth and gum surfaces are in good condition for the use of a dentifrice wherewith to finish the process of cleaning. This is important to my mind. Take, for instance, the picture with which the Colgate Co. advertise their new ribbon paste, the picture showing the brush covered with a layer of paste. I am inclined to think that such an amount of paste applied to the teeth at the beginning of the operation will so coat the teeth surfaces that any mucus attached to them is liable to be glossed over, and on close inspection a covering of paste and underneath that a coating of mucus will probably be found.

I therefore think it a good plan in cleansing the mouth to use the brush with clear water first, and then to apply a moderate amount of dentifrice.

Dr. T. M. MILAM, Little Rock, Ark. It has been said that science is truth, and that truth depends upon the viewpoint of the individual practicing a scientific principle. In Arkansas we do not take time to trouble about the gums in cleaning teeth, and for that reason we do not injure them in prophylactic treatment. There we practice on the scientific principle of leaving conditions alone when we cannot better them.

I think the essayist has made a great mistake in speaking of mistakes being common and uncommon. All mistakes, in my opinion, are common. I have practiced every method that I have ever heard of or have ever seen demonstrated, except filling a tooth with amalgam; I have learned from Dr. Johnson, Dr. Atkinson, and other authorities, yet I have not gained much. I have spent forty years in the practice of dentistry, and expect to spend ten more, and I have ruined teeth with drills and without drills, and have seen others doing the same. For my part I will never again put a drill in a tooth. I have tried prophylactic treatment according to Dr. Ebersole and the essayist, but have never accomplished much, though I hope to know better and do better.

Speaking of ethics and honesty, I have known a great many dentists in my time, and I believe that a man is as honest as his knowledge will enable him to be.

Dr. JOHNSON (closing the discussion). I wish to refer especially to the method of filling root-canals mentioned by Dr. Callahan. If the filling material which he has suggested will be found to penetrate the dentin to the cementum, it will be very valuable for us, and I thank him especially for bringing it to our attention on this occasion.

Dr. Watkins misunderstood me slightly in regard to the use of the drill in a canal, and I cannot blame him for that, because I covered that part so briefly, as the whole paper was brief. I am beginning to have a horror of reading papers that are too long and tiresome. Should I live long enough to read as many papers as I have read in the past, these papers will probably be reduced to half the present length. I intended to demonstrate that the use of the drill is not always necessary, but that it is desirable to ream out slightly canals constricted near the pulp-chamber, in order to find the direction of the canal. I insert a drill no farther in a canal than up to its curvature. I agree with the gentleman who was so enthusiastic over the use of the drill, that it is hazardous to insert a drill in any canal beyond the point where we have reason to believe it to be straight. In most canals I would rather depend upon a broach than a drill, but I have not placed a barbed broach in a root-canal for ten years, trying to employ instead a broach that is not so easily broken.

I wish to thank my friend from Arkansas for his enthusiastic indorsement of my remarks. Such indorsement coming from Arkansas is more highly gratifying to me than if it came from any other section of the country, for the reason that Arkansans usually speak from the shoulder as he did, and voice their convictions, and it is always worth while listening to such men, whether we agree with them or not. In one point, however, I disagree with Dr. Milam. I understand him to say that we are all as honest as we know how. I wish to Heaven this were true! If mankind generally were as honest as they know how, we would have no need of penitentiaries in this country. We may be "as honest

as we can," but if we were as honest and did as well as we know how, there would be no need for further human progress from that moment.

The next order of business was the reading of a paper by Dr. W. R. CLACK, Mason City, Iowa, entitled "Review of a Paper by Dr. P. B. McCullough, Entitled, 'Wherein Clinical Evidence is At Variance with Extension for Prevention,'" as follows:

Review of a Paper Entitled "Wherein Clinical Evidence is At Variance with Extension for Prevention,"

As read by Dr. P. B. McCullough of Philadelphia before the Susquehanna Valley (Pa.) Dental Society, May 18, 1909.

By Dr. W. R. CLACK, Mason City, Iowa.

THE reading of Dr. McCullough's paper (see *Dental Cosmos*, October 1909, vol. li, p. 1174) brought to my mind the story of the old whig who was an enthusiastic supporter of Harrison and Tyler in the campaign of 1839–40. Under the influence of the hard cider for which the campaign was noted he got into a fight, and received an injury to the brain that caused complete suspension of all perceptive and reflective faculties. He ate, drank, slept, and wandered around perfectly harmless, unheeding the stirring issues of the times, and the passing of the years. He was a familiar figure around the White House, and some returned army surgeons who made a diagnosis of his case reached the conclusion that the lesion of the brain was only temporary, and that an operation would in all probability relieve him. The operation was performed that beautiful morning in the summer of 1865 when our victorious army was marching, in grand parade, down Pennsylvania avenue in Washington. The anesthesia passed off, and the long slumbering brain, beginning where it had left off in 1840, resumed normal functions. Hearing the blare of the bands, the booming of the cannon, and the shouts of the multitude, the old whig sat up on his cot and shouted, "Hurrah for old Tippecanoe, and Tyler too!" and began to argue the questions of that memorable campaign. He could never be persuaded that old "Tipp" had slumbered with his fathers for a quarter of a century, that the civil war had been fought, and the question of state rights forever settled.

So with the essayist. He does not seem to comprehend that the question of "extension for prevention," which he thinks he is attacking, has been fought out and settled just as surely as the preservation of the Union.

I have been going to the Twin Cities for the last ten years to avail myself of the good to be gotten from association with one of the most progressive bodies of students of dentistry in the world. Most of this time my visits have been monthly, and I think that not once in the last five years have I heard extension for prevention discussed. It has passed the point of discussion and is accepted by

the progressive dentist just as finally as asepsis is accepted by the progressive surgeon.

After reading an article like Dr. McCullough's, one is likely to think of that passage in Matthew: "Let them alone, they be blind leaders of the blind. And if the blind lead the blind, both shall fall into the ditch." This passage may have represented the spirit prevalent at the time when it was written, but a gentler gospel prevails today. While we may have no sympathy to waste on the man who is blind because he wilfully closes his eyes to the light of truth and progress, and apply these words to him, our sympathies should go out to the innocent follower who may unwittingly follow a blind leader to his own destruction. It is for the good of those young men who have not had the opportunity to know what extension for prevention really is that I am calling attention to the misrepresentations of the essayist.

Extension for prevention, as taught by Dr. Black and his intelligent followers, needs no defense or apology, but when a man in the public prints attempts, ignorantly or wilfully, to misrepresent the teachings of Dr. Black and his disciples as to what extension for prevention really is, it is time to call him to account. Every man has a right to his own opinion, and has the right to express that opinion, but has no right to misrepresent the expressed opinions and teachings of another.

The first criticism to be made of Dr. McCullough's paper is that he uses the term "extension for prevention" as a part of his text, as if that method were the prisoner at the bar, and then proceeds to talk about nearly everything that extension for prevention is not, and vainly tries to throw all the mistakes of those who do not use that method on extension for prevention.

I have caused to be circulated through the house copies of Dr. McCullough's paper, with the paragraphs numbered so that we may refer to them in this paper and in the subsequent discussion.

DEFINITION OF EXTENSION FOR PREVENTION.

I will first define the various kinds of extension, that we may not in our talk confuse them one with the other or with the so-called extension for prevention as taught by Dr. Black's near-followers and opponents. I ask that if in this definition I make one false statement I may be immediately interrupted, and that you, Mr. Chairman, will recognize any person so interrupting and allow him to set me right, so long as he speaks to the point at issue.

First of all I would state that extension for prevention means extension for the prevention of recurrent caries and nothing else. The words of Dr. Black are: "Extend until the cavity margins are in immune area, then stop;" also, "Any other extension is for some other purpose, and must not be confounded with extension for prevention."

Next is "extension for convenience," which is the making of every part of the cavity accessible and has nothing to do with extension for prevention.

Another kind of extension, designated by Dr. Wedelstaedt as "precautionary extension," deals only with those margins subject to heavy stress, and does not concern extension for prevention.

Is there one present not understanding these definitions and limitations? The rule given first is arbitrary; the margins must be extended into immune area, *i.e.* where the excursions of food, the

tongue, and the lips shall cleanse those margins. Those lines may change on the surface of the tooth as the position of that tooth in the arch and its relation to the other teeth change, but the requirement does not change. The second requirement is more or less a matter of personality, but access must be had. The last requirement is a question largely of stress, its direction and amount.

PATHOLOGY OF CARIES AND EXTENSION FOR PREVENTION.

We will take up Dr. McCullough's paper by sections, and consider first those statements that refer to pathology of caries and extension for prevention.

[Section 1.] The time of greatest susceptibility to caries in the average subject is during the period between childhood and puberty.

This statement we shall pass unchallenged.

[Sec. 2.] The absence of scientific data explaining why, with the presence of the destructive microbes at all periods in the mouth, caries is not always active, permits the reasonable though empirical explanation of lowered vital resistance due to the increased demand on the nutritional supply while this important physiological change is taking place. As the histological and chemical evidence tends to prove that the difference in composition of the teeth has no bearing on their ability to resist decay, the only other ground for the above statement would seem to be the effect which this state of disturbed nutritional equilibrium would have in modifying the oral secretions to the extent of their becoming media favorable to the development of the destructive bacteria.

Dental caries does not necessarily depend on changes in the oral secretions which favor the development of destructive bacteria. The number of these organisms present in the mouth may have no relation whatever to the progress of caries. The quantity of lactic acid produced in the mouth and mixed with the saliva has no relation to dental caries. That there is a difference in the oral secretions of persons susceptible to and immune to caries has been definitely demonstrated by Dr. J. P. Michaels of Paris, and considerable additional information has been given by the Committee on Research of the New York State Dental Society. These differences in the saliva need not in any way modify the multiplication of bacteria, but apparently an opportunity is furnished by which colonies of organisms may grow in contact with the surface of the enamel in sheltered positions in such a way that the acid which they form will not be mixed with the saliva, but will be held in concentrated form in contact with the surface of the enamel.

[Sec. 3.] It is the purpose of this paper to discourage radical technical procedures, from the belief that the technique of cavity preparation cannot be said to be scientific until the problems involved in the cause of caries in one case and its absence in another are better understood.

For the man who has been a careful, unprejudiced clinical observer for any reasonable number of years, no additional information is necessary to justify the putting into practice of all of the principles of extension for prevention. The man who does not understand these principles, and who has not observed the clinical conditions on which they are based, certainly should not employ "radical technical procedure."

[Sec. 4.] As the susceptibility or immunity of the teeth to decay is not due to any difference in structure, but to causes external to the teeth, it follows that a filling having no control over the forces responsible for caries must be an indifferent remedy during a period of continued activity of the disintegrating elements.

Because decay is not due to any difference in structure, it does not fol-

low that a filling has "no control over the forces responsible for caries." It does control them to the extent that it is indestructible by those forces, and thus prevents recurrence of caries wherever it prevents those forces from coming in contact with tooth structure.

[Sec. 5.] A review of the histological investigations of the pulp by Miller, Latham, Talbot, Black, Broomell, and Andrews, together with a number of others, cannot fail to impress one with the delicacy as well as with the importance of this organ. A thought reflected by Dr. Latham in her statement in the *International Dental Journal*, vol. xxii, page 612, is: "One noteworthy point is the constant effort directed to the 'killing of the pulp' by every known means, and the very little encouragement to try to save the 'formative organ.'"

Pulp conditions cannot properly be considered in discussing the principles of extension for prevention, because extension for prevention has absolutely nothing to do with depth of cutting, but only with surface extensions which involve slightly more than the depth of enamel thickness.

[Sec. 6.] To quote from Andrews, *International Dental Journal*, vol. xxv, page 759: "The pulp fibrils are as much a part of the pulp as any portion of it, and are the channels by which its vital functions are carried on. . . . . Each canal contains a fiber bathed in a fluid, and this fiber is an arm of the pulp. Branches from this fiber anastomose with others through the dentin matrix. They form a delicate network in the substance of the crown near the enamel. . . . . The function of the pulp is not only to vitalize, but it may again assume its formative function whenever causes for repair demand this action."

The statement quoted seems to carry the assumption that the exposing of a number of dentin fibrils is equivalent, or nearly so, to the exposure of the pulp itself, without reference to the depth of the cutting in the dentin. Millions of teeth in which cavities have been prepared and filled, and in which the pulps remain vital, are sufficient reply to this.

[Sec. 7.] Exceptional instances of this latter function are illustrated by Miller in the *Dental Cosmos*, vol. xliii, page 583, and in the *International Dental Journal*, vol. xxiv, page 649. With this last-named paper appear two photomicrographs, one showing a diseased pulp horn isolated by secondary dentin, and the other the isolation of an abscess of the pulp by a thin wall of calcific deposit.

If any man can show me any connection between this paragraph and extension for prevention, he will do me a kindness.

[Sec. 8.] The upper bicuspids, because of their form, are structurally the most delicate and as a rule are the first to be lost; therefore the phases through which these teeth only too often and too early are seen to pass in their retrograde change through life teach a lesson. The history of any one of them may be stated as beginning at the time of youth with an approximal cavity backed by a healthy pulp active in building a protective barrier opposite the point of invasion. The operator breaks in the marginal ridge, extends the cavity occlusally, gingivally, buccally, and palatally, exposing with accompanying irritation and pain the pulp fibrils, and packs a metal filling, the antithesis in conductivity to the insulating structure removed, and the pulp suffers its first shock from an artificial irritant.

I hardly think the records will bear out this statement. I think observation will show that many more first molars, both upper and lower, and upper lateral incisors are lost than bicuspids. The other statements do not apply to extension for prevention, but to the depth of cutting. If the pulp is endangered, there is ample clinical experience of the value of non-conductors for its protection.

[Sec. 9.] Years pass, when the filling is judiciously removed to relieve a putrescent pulp and to fill the canals aseptically. The cavity margins have already been extended to the "excursion line;" they need only to be shaved. A second filling is inserted, but without the step, and the second phase in

the retrograde change is recorded. An accident enters next, and the buccal wall gives way. To preserve the palatal wall, a shell crown becomes the remedy, inviting fermentation at the gingival margin, until recurring pericemental necrosis and the forceps end the story.

The same is true of this paragraph; extension for prevention does not apply. I will have more to say of the methods spoken of here later on.

[Sec. 10.] Cases without number are in constant evidence in which gold fillings have been inserted in patients of from twelve to eighteen years, with resultant fistulæ appearing later in life, the operation speeding the devitalization, which often would have been delayed if no filling at all had been inserted.

This refers to the death of the pulp by injudicious operating, and has nothing to do with extension for prevention.

[Sec. 11.] When the average period of comparative immunity following puberty is considered, how much better this retrospect would be if the teeth had not received the radical operative interference characterized in the above brief summary.

The same may be said of this as of the three preceding sections.

[Sec. 12.] Considerations involving filling as a remedy should include the preservation of the pulp and the maximum strength of the tooth, both of which are obtained by economy of structure, the operator being mindful of the approach of that time of life when caries is least to be feared and the last stand is made to protect the soft tissues until atrophy destroys the last physiologic support to the peridental membrane.

The preservation of the pulp and the conservation of tooth structure are attained by extension for prevention if properly carried out. The "preserve" as used by the essayist applies to the future life and usefulness of the tooth. A cavity so economically prepared as to permit a recurrence of decay would not preserve the maximum strength of the tooth.

[Sec. 13.] A knowledge of the histological relation of the enamel rods is important for the intelligent understanding of the character of structure worked upon; this knowledge, however, cannot with reasonable practicability govern the character lines of cavity formation or marginal bevels.

[Sec. 14.] If the interprismatic cementing substance were more or less resistant than the rods, the accidental fracture of enamel would show surfaces following rod alignment; yet the characteristic angular fracture shows the direction of the application of the force bisecting the rods and the cementing substance exactly as if the rods and cement were one histological homogeneous structure.

The splitting of the enamel along rod directions may be easily demonstrated with a sharp chisel in the extension of almost any cavity, but has nothing to do with extension for prevention.

[Sec. 15.] Dr. Walkhoff, disclaiming Williams' idea of the cement substance, says that the rods are actually in contact. (*International Dental Journal*, vol. xxiii, page 719.)

[Sec. 16.] A beveled margin, as such, no more resists chemical action than does a square margin. Brittle substances like enamel are sensitive to mechanical injury from blows of the percussion type. such bodies resisting much greater force when gradually applied. The axial* margins of a filled cavity are not exposed to this sudden impact as may be the occlusal surface.

The idea in 15 is as ancient as the preserved eggs of the Chinese and neither is discussable in this intelligent and polite day, and as neither this nor paragraph 16 have anything to do with extension for prevention, we will pass them both.

[Sec. 17.] No filling material has at its square edge the edge strength of the square edge of enamel. The beveling of enamel margins for protection is illogical when the weaker body is to provide the protection. If beveling for protection is necessary for gold, then square enamel margins should fail with amalgam, offering less protection, and still more with inlays offering no pro-

* "Axial" is used to denote the buccal and palatal walls of a cavity.

tection when after a few weeks the cement at the surface disappears.

[Sec. 18.] Any technical method of procedure is objectionable in proportion as it is difficult of execution, for the reason that average skill is below the requirements. This truth seems to be recognized by the exemplars of dental manipulation, as instanced by the fact that, when the carious surface of a tooth is given for a clinic, that surface usually happens to be the mesial—for against the beveled walls of a cavity so situated it is so much easier to pack gold.

[Sec. 19.] Forming the gingival wall on a horizontal plane offers no advantage either as a means for prevention or as a base for seating a filling.

I cannot agree with the first statement, on which the others are based. The cavo-surface enamel is strong or weak according to the length of the rods composing the angle and their dentinal support. Neither this nor paragraphs 18 and 19 apply to extension for prevention.

[Sec. 20.] The area of greatest susceptibility to recurrent caries is at the gingival margin; whether the line of cavity formation at this margin be straight or curved can serve no purpose as a means for prevention.

This statement is correct so far as prevention of recurrence of decay is concerned, if the area of liability is included in the outline.

[Sec. 21.] A flat gingival wall becomes a seat according to its internal formation, and together with the axial walls; a curved cervical wall becomes a seat according to its internal formation and together with the axial walls, so that when the axial walls are involved in filling, the plug is secure against rocking. This fact is equally patent whether the base be flat or curved.

[Sec. 22.] Because of the considerable difference in mesio-distal measurement between points at approximal contact and corresponding points at the neck of a bicuspid, when the axial cavity walls are made parallel and join the flat base at an angle, because of the surface slant of this tooth, packing against these walls is made more difficult, while the tendency to "slide off" is increased by the bevel. On the other hand, if the curved gingival margin be made continuous with the axial walls, and conforming to the occluso-gingival surface convergence, the axio-gingival curve is much easier packed against, and the tendency to "slide off" is materially lessened.

[Sec. 23.] It has been said that the anchorage must conform to the extent of filling surface exposed to stress. In conformity with this a small approximo-occlusal cavity must be extended on the occlusal surface, forming a step, thereby increasing the surface exposed to stress; therefore increase the surface of anchorage. As cavities of decay present, difficulty in conforming to the above rule will be found, in that when the extent of decay is so slight that ample dentin remains to form a step it is not necessary, and when the extent of decay is such as to make desirable the step, no dentin remains to make it in. By dividing the bond of union between the cusps of the weakest tooth and substituting a malleable material, the danger of splitting is increased.

These three paragraphs refer only to the inner cavity preparation, and as none of these is an argument for or against extension for prevention we will pass them over.

[Sec. 24.] *The area of immunity to decay is that part of the margins of a cavity not decayed.*

One might as well say that the person who has not been vaccinated and has never had the smallpox is immune, or that the fire-proof part of a city is that part not yet burned.

[Sec. 25.] The extension of these cavities to involve the angles—which are surfaces less prone to decay—is based upon the assumption that surfaces not decayed will decay if not cut out at the time of filling; and as assumption is not science, this leaves science in the background and leads into the realm of the problematic.

As careful clinical observation has failed to demonstrate recurrence of decay along cavity margins properly made on the angles of the teeth, but has demonstrated millions of cases where this precaution has not been carried out, the

"assumption" is all on the part of the man who is too lazy or too ignorant to extend his margins to those "surfaces less prone to decay."

[Sec. 26.] Evidence to dispute the accuracy of such reasoning is seen where there has been no recurrence of decay around imperfectly packed gold in approximal cavities with their margins in contact. Again do we see it in the uninjured surface of one tooth enveloped by a cavity in its neighbor—a condition most favorable to decalcification—showing either that the sound tooth is less susceptible, or that the forces responsible for decay active on the surface of one tooth had suspended their operation before the other became involved.

The fact that we call attention to a few isolated cases is no evidence for upsetting the overwhelming evidence of hundreds of thousands of cases recorded after careful clinical observation.

Last winter, in Mason City, a man was stabbed seven times, one cut in the abdomen passing through both walls of the stomach, the bones of the pelvis arresting the point of the knife, the wound being filled with a mass of more or less digested food and liquor. The entire medical corps of the City Park Hospital were as pessimistic in regard to the victim's recovery as the followers of G. V. Black are about the future of a tooth in an environment such as spoken of by the essayist. Contrary to all precedent and expectation, the man recovered. Simply because the unexpected happened in this isolated case, would it be well to reason that this was a normal case, and that all similar cases would recover? Because a few cases have been observed where a tooth has not been carious when exposed for a time to faulty environment, would the essayist have us refuse to correct the faulty environment, simply because he did not know the causes that led to the initial decay?

[Sec. 27.] To claim the right to extend an original cavity because other fillings failed in like cavities not so extended is unjustifiable without a knowledge of the other possible contributory causes to such failures.

The above answers paragraph 27 as well.

[Sec. 28.] It is further stated that the lateral extension of these walls is to bring the margins within the path of the excursions of food, so that they may be cleaned by friction in the act of mastication. This, to be complete, would require that some other force or agent be utilized to similarly protect the gingival margin between the axio-cervical angles.

If the essayist knew the rules of extension for prevention, he would not have made this break. It is true that we extend the lingual and buccal walls laterally to bring the margins within the path of the excursions of food, but we extend them gingivally also until the gum septum in the apical space shall cover that margin (see Figs. 1 and 2), and we have an absolute certainty that any margin so covered with healthy gum tissue will never decay. If the margins are left as in Figs. 3 and 4 recurrence will take place if the patient lives. There is no more susceptible area than E E and F F. This is one of the articles of faith of the Black followers.

[Sec. 29.] Curved margins are more graceful than angles. Curved walls are more conservative of strength than angles. Shallow grooves are more conservative of structure than are angles.

[Sec. 30.] There is greater danger of impairment of pulp function with the angular type of cavity preparation.

These sections—29, 30—refer to internal cavity preparation and have nothing to do with extension for prevention, though we may take them up later under a different heading.

[Sec. 31.] *The character lines on which a cavity is prepared, and the skill with which*

gold is inserted, are the least of the factors preventing recurrent decay.

If by "character lines" the essayist means the outline of the cavity margins, he is only making an assertion without a particle of evidence to back it with, and coupled with the next clause, the statement is too silly to waste any time on. One might as well say that the lines on which an architect constructs his work and the skill with which the work is executed have nothing to do with its permanence.

[Sec. 33.] In the paper by Dr. Miller, before referred to (*International Dental Journal*, vol. xxiv, page 650), we read: "In the second case [there illustrated] we have a lower molar in which the enamel has been completely destroyed by decay and the dentin decalcified nearly or quite to the pulp. The caries, for some reason, stopped at this stage and the decalcified dentin became hard and black. In other words, it is a case of self-healing of the dentin. Strangely enough, we find a self-reparative process going on in the pulp at the same time.

The two foregoing sections have nothing to do with extension for prevention.

FIG. 1.

FIG. 2.

FIG. 3.

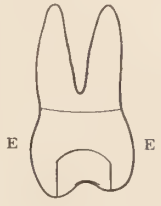
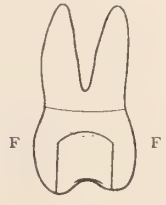


FIG. 4.



[Sec. 32.] In a work by Robert Arthur, Philadelphia, 1871, recommending the simple removal of the carious area and polishing the remaining exposed surfaces, without other treatment, the author is most positive that by this method he could stay the progress of caries. He quotes a letter from Dr. W. H. H. Thackston, stating in part: "I frequently meet with pearly soft teeth that I filed freely twenty and twenty-five years ago, sound and good, with texture hardened by time and the change that occurs in all dental and osseous tissue as we advance in age; with surfaces shining and lustrous as if some natural polishing forces had been going on in the mouth during the interval. On the other hand, I have to deplore the comparative failure of some of the most perfect and beautiful fillings that cost me hours and days of patient, painstaking labor. . . . . Dr. Eleazar Parmly of New York paid one such of my cases the compliment of saying it presented the most perfect specimens of proximate filling he had ever seen. And yet, although the patient was an attentive and appreciative one, who was fully instructed and spared no pains in the care of her teeth, decay, after a few years, commenced around the edges of the fillings.

[Sec. 34.] *Three general clinical factors governing in diagnosing conditions of caries, with relation to treatment, in the average patient between childhood and puberty are:*

(1) The general nutritional state.

(2) (a) Commencing period of decay; (b) active period of decay; (c) declining or past period of decay.

It is well to consider these factors and others as well, including the possibility of recurrence of susceptibility in persons who for some time have been immune.

[Sec. 35.] (3) State of suspension of activity of elements responsible for decay, as indicated by changed appearance in tooth structure.

The following are cases from practice as treated in conformity with, and in disregard to, the above plan:

Case I. A girl, age fourteen, with good general health and mental and physical attributes of complete puberty. A period of decay was regarded as passed, there being a number of occlusal and approximo-occlusal cavities, several of such extent of caries as to require both gutta-percha and cement inter-

mediates. All cavities were filled with gold. All teeth were present and vital. After six years no other work has been done.

[Sec. 36.] *Case II.* A first cousin of case I; age twelve, with good general health and the mental and physical signs of girlhood. Here was a commencing period of decay. All of a number of small cavities were filled with gutta-percha. During a period of seven years the work has consisted in the occasional renewal of the gutta-percha without extension of the original cavities, and the occasional filling of a new cavity. (All these cavities will be filled with gold, not inlays, at the proper time.)

Case III. This is an exception to the general rule, the case being that of a married woman of poor nutritional state who apparently has never been free from susceptibility to caries. Nearly all the molars were lost, and only the roots of five of the upper front teeth remained when the writer was consulted. One upper bicuspid was conspicuous among all the remaining teeth as having the appearance of a superior organic matrix. The mesio-occlusal cavity was filled with gold, which is unchanged after six years. All the other teeth have been treated palliatively, except the anterior roots, which were crowned. No teeth have been lost, no pulps destroyed, nor has any change taken place during this period, indicating metal fillings.

Case IV. A girl of ten years, with a small occlusal cavity in each of the lower first molars. The conditions were as nearly alike as it is possible to imagine. One was filled with gold, the other with gutta-percha. The cavities were prepared alike. The gold filling failed within two years, owing to recurrent caries; the gutta-percha filling, except for its being a little worn, was intact, as were the cavity margins.

Case V. A girl of fourteen years. Though the patient was not sickly, her nutritional status was not good. She presented the active period of decay. The mesio-occlusal cavity of an upper bicuspid was filled with gold. The filling failed within two years owing to recurrent caries.

These sections say nothing for or against extension for prevention.

[Sec. 37.] It seems to be the rule that most filling for initial decay is done during the period of usually greatest susceptibility before puberty, and that most dental work after that, if the teeth remain, consists in refilling the original cavities after failure of the fillings, or in the necessary removal of these fillings for the treatment of putrescent pulps which died under or were killed by the fillings. The fact that so much work is usually done during this period explains the impression reflected by the laity in the common though significant statement: "My teeth are soft; fillings do not last." It is the character of the treatment which the teeth receive during this period that is chiefly responsible for the death of the pulp and its chain of consequences.

This statement is a strong argument for extension for prevention, as it shows what is likely to occur where extension for prevention is not practiced.

[Sec. 38.] As before stated, as the formation of a cavity or a filling can have no control over agencies external to the tooth that are responsible for decay, "extension for prevention" becomes a negative remedy.

This statement has been answered under section 4.

[Sec. 39.] As the character of approach to a simple approximal cavity from the buccal aspect will not permit either of the best possible preparation or the best packing of gold for adequate support to the marginal ridge, it follows that the marginal ridge should be removed; to this end, therefore, from a purely mechanical standpoint, *extension for access only* becomes a definite requirement.

This, like twenty-eight other paragraphs of this alleged onslaught on extension for prevention, has no bearing on extension for prevention.

These mighty men of straw—which the essayist builded that he might annihilate them with his alleged anti-extension serum—having been rescued, we will now consider the essay from the standpoint of twentieth-century dentistry. In his zeal the essayist has charged the advocates of extension for prevention with many deeds which neither they nor any other men who are at all progressive ever think of committing. He is also lame in his reasoning from cause to effect.

In sections 7 and 8 he speaks of a

"diseased pulp horn isolated by secondary dentin" and "the isolation of an abscessed pulp" in the same way as if the isolation had been accomplished after the parts had been diseased. I cannot believe that the deposit of secondary dentin goes on after there has been an abscess of the pulp. There may have been a slight breaking down of the pericementum in which the pulp was not involved, but when a pulp that has become putrescent resumes normal functions and begins to deposit healthy secondary dentin, then decalcified dentin becomes recalcified.

I will pass around a molar that was removed because of an alveolar abscess on the lingual root. It will be seen that this tooth had suffered from mechanical abrasion as well as from caries, and that the pulp had not "builded a barrier," though no "radical operative procedure had been attempted."

I think the essayist overestimates the recuperative power of the pulp as opposed to rapid caries. Thirty-five years' observation has led me to believe that the pulp pays very little attention to caries until the infiltration of acid begins to irritate it, and then it is quite often too late; but I do believe that mechanical abrasion will stimulate the pulp to throw out secondary dentin, and when the loss of tissue is not too rapid the pulp chamber may be filled with secondary dentin and the usefulness of the tooth prolonged. But often in constricted channels the deposit never reaches the pulp chamber, but occurs in the canals, and these may often be filled to the apex, as is the case in the root shown.

We are told that bacteria are ever present and only waiting a lowering of the general health of the patient to start up trouble. An abscess is formed on the root, and when the patient seeks relief in extraction, so the essayist states, we have "a diseased pulp horn isolated by secondary dentin" and a putrescent pulp chamber, also isolated. Do not be misled by the nicely rounded sentences! Dead pulps build no secondary dentin.

It is difficult to comprehend just what the essayist means by the following statement: "Beginning at the time of youth with an approximal cavity backed by a healthy pulp, active in building a protective barrier opposite the point of invasion." The "time of youth" is a very indefinite term, and may cover a period up to ten or more years, and an approximal cavity no doubt means a cavity in the approximal surface of a tooth, but how in the name of reason can a cavity of decay be said to be "backed by a healthy pulp," when in reality it is opposed by that pulp?

FIG. 5.

Molar in which the root-canals are filled with secondary dentin, while the pulp chamber is not.

Again, in section 9 the essayist says: "Years pass, when the filling is judiciously removed to relieve a putrescent pulp." The removal of a filling made after the Black method in the approximo-occlusal surface of a bicuspid, in order to gain access to a putrescent pulp, is not judicious; it is decidedly injudicious.

As well might the surgeon open from thorax to pubes to make a small navel operation. A small hole drilled through filling and tooth in the occlusal surface will afford perfect access to the root-canals of an upper bicuspid, and is a very simple operation. The removal of a filling under such circumstances, for such a purpose, savors too much of the charlatan who seeks to magnify the operation in order to increase the fee.

lingual and buccal walls. Dr. M. L. Rhein of New York city has for years made operations for this class of cavities that save the teeth and delight the eyes of those fortunate enough to see them.

But we will suppose that the buccal wall has already split off, as the essayist says. Why, then, commit an error worse than those made by all the ignorant operators who have preceded him? Since the

FIG. 6.

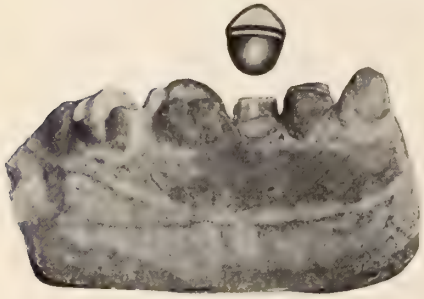
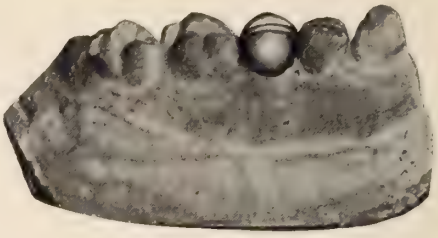


FIG. 7.



An inlay crown. Note improved condition at gingival margin as compared with a shell or Richmond crown.

Again I quote: "A second filling is inserted, but without the step, and the second phase in the retrograde change is recorded." "An accident enters next, and the buccal wall gives way." The most likely thing in the world! If a man bisects a bicuspid and then makes another filling in it without a step and without protecting the cusps, and one or more cusps split off, it is not an accident, it is malpractice, and extension for prevention does not teach such procedure. The Black followers are taught to protect weak cusps from the stress of occlusion, and when a tooth is cut through mesially and distally, as the essayist describes, we are taught to cut off and restore the cusps. He does not need to come West to learn how to protect weak

introduction of the cast inlay, the shell crown in such a case would certainly not be indicated from an artistic, physiological, or hygienic standpoint.

I submit for your inspection a practical case which I think is not open to many of the objections that apply to the shell crown. (Figs. 6 and 7.) If the essayist wishes to conserve tooth structure and avoid all the evils of which he speaks in the last clause of section 9, why should he not use an inlay like this instead of a shell crown? I might remark in passing that the condition in which I found this tooth was not the result of "radical operative interference" by some philistine of extension for prevention, but was the result of trusting to "a healthy pulp, active in

building a protective barrier opposite the point of invasion."

Just what the essayist intended to say in section 10 is not quite clear. It certainly has no bearing on extension for prevention. Let us read what he says, and try to analyze it: "Cases without number are in constant evidence in which gold fillings have been inserted in patients of from twelve to eighteen years with resultant fistulæ appearing later in life, the operation speeding the devitalization, which often would have been delayed had no filling at all been inserted." We will take for granted that the essayist wishes us to understand that gold fillings had been made in cavities in the teeth of patients of from twelve to eighteen years of age, and that alveolar abscesses resulted, but he does not say where the fillings were inserted, nor where the fistulæ appeared, except that it was "later in life," which is a very indefinite location. "The operation speeding the devitalization." Will someone kindly tell us what was devitalized—the pulp of a tooth, the tooth, the alveolar process, the maxilla, or the "patient in whom the fillings were inserted"? This is certainly a deplorable condition of affairs, but as we are left without any specific statement of conditions existing before the fillings were inserted in these patients, and as it is the purpose of the essayist's paper to "discourage radical procedures until the problems involved are better understood," we are unable to draw any useful lesson from the harrowing tale.

Section 16: We do not bevel the enamel margin to assist it in resisting chemical action. We bevel the cavo-surface angle to do away with short enamel rods, and cover the margins with gold to allow the ductility of the gold to protect them from stress by causing the force to be distributed over a larger surface, thus lessening the shock from the cusps of the opposing teeth in the act of mastication. The protecting of brittle margins or edges by the interposition of some softer, more ductile substance between them and the opposing hard substance is not illogical, but is intensely practical. What does the architect do when he sets heavy plate-glass in iron frames or when he sets iron pillars on stone or concrete bases? He puts a layer of sheet lead between the opposing surfaces and makes the weaker protect the stronger. An assistant who has stood at the dental chair six months knows that gold will and does protect properly beveled margins from the stress of occlusion. This kind of beveling or extension, however, is not extension for prevention, but is precautionary extension.

The vamps of my shoes are not exposed to the same sudden impact and grinding stress with the concrete walks as are the soles. You may not be able to see what connection that remark has with extension for prevention. Neither am I able to see the connection between extension for prevention and this sentence of the essayist: "The axial margins of a filled cavity are not exposed to this sudden impact, as may be the occlusal surface." In the first place, there is no such thing as an axial margin, so what does not exist cannot be subject to stress. There is only one axial wall to a cavity, and that wall has no margins subject to stress. The margins that the essayist refers to I should designate as the lingual and buccal margins of the approximal portion of the filling. The axial wall of a cavity is that wall which is next to the pulp parallel with the long axis of the tooth.

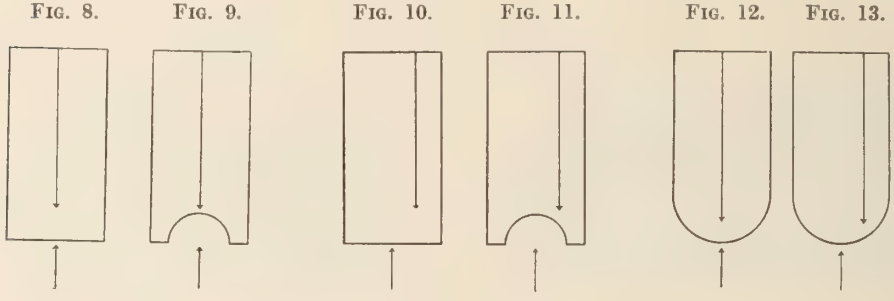
It might be well for that good author-

ity on cavity nomenclature Dr. Thos. E. Weeks of Philadelphia to organize a post-graduate class in his city.

Section 19: "Forming the gingival wall on a horizontal plane offers no advantage either as a means for prevention or as a base for the seating of a filling." The essayist is speaking without considering the significance of words. No one has ever contended that the forming of the gingival wall on a flat plane had anything to do with extension for prevention of recurrent caries, but we do insist that it has everything to do with the proper seating of a filling. As well may the architect say that seating, the foundation of a building on a horizontal plane offers no advantage.

We will include sections 21 and 22 in this discussion. We will also refer to a few illustrations to better explain the seating of a filling. (See Figs. 8 and 9.) With a base formed like either of those illustrated, a successful architect tells me, stress can be placed until the crushing-point is reached, without tipping, even when the stress is applied to one side of the center, as in Figs. 10 and 11, but if formed as in Fig. 12 it would be exceedingly unstable, and if the stress were applied as in Fig. 13 the lateral walls would have to be very strong or they would split off, as in the case spoken of in section 9. The architect's comment was: "A builder who would place a load on a base like the one in Fig. 12 would be either ignorant or criminal."

Section 21 is such a confused mass of terms that I doubt if the essayist knows what he wishes to have us understand by it. Does he have both a gingival wall and a cervical wall in the same cavity preparation, or two axial walls in one cavity? If he does, I should like to have him explain where he stores them. A filling made in such a cavity preparation as he attempts to describe would indeed be a "plug," and if he depends on the lingual and buccal walls to carry the occlusal as well as the lateral stress that is exerted on the filling, he will surely have many lingual and buccal walls split off, no one of them being caused by extension for prevention. (See Figs. 1 to 4, page 231.)



Sections 20 and 28 can be answered under one head. The essayist again shows his ignorance of the principles of extension for prevention, or he would not have made such remarks. He is blaming extension for prevention for a condition that extension for prevention will prevent. Extension for prevention teaches us to carry the gingival margin under the gum line, since then there will be no recurrence of decay. Neither the essayist nor any other practitioner ever saw a case of primary caries or of its

recurrence under a healthy gum margin. Even that free lance, acid erosion, is impotent under the conditions found beneath healthy gum tissue. Dr. G. V. Black, in answering a question regarding this matter, says:

"It is curious that so many men have misunderstood this point. I am sure that I have always been very careful to state that the gingival margin of a filling, in the proximal surface, should always be under the free margin of the gum tissue. In regard to the micro-organisms which produce the acid that first dissolves the cementing substance from between the enamel rods, you can quote me as stating that these micro-organisms do not live under the free margin of the gum. It is possible that some may be found there, but it is quite certain that if any are located there they do not cause any dissolution of the tooth substance in such a position. You know very well that we do not see decay beginning or progressing on the surface of a tooth under the free margin of the gum. The only way the enamel of this portion of a tooth can be involved in the carious process is for the decay to have first started on the exposed surface of the tooth, penetrated the enamel and into the dentin, and then extended into the dentin laterally under the enamel, thus undermining it; and it may in this way cause decay of the enamel under the gum, but from the dentinal ends of the rods toward the surface (backward decay of the enamel), and the enamel so weakened may break away, and thus the cavity will be extended under the gum."

Again, in section 22, the essayist speaks without thinking in regard to cavity preparation and the packing of gold. The mesio-distal diameter of an upper bicuspid being greater at the point of approximal contact than at the gingival margin makes absolutely no difference in packing the gold, if the cavity preparation is correct. With a flat gingival wall or seat at right angles to the long axis of the tooth (not at right angles with the convexity of the approximal surface of the tooth), with the lingual and buccal walls at right angles to the gingival wall and parallel to each other, and the axial wall parallel with the long axis of the tooth, which will bring it at right angles to the gingival, lingual, and buccal walls —by this preparation a square box is obtained with flat bottom and with every part of the cavity in plain view of the operator.

We will not speak of the step preparation in the occlusal surface, because that does not enter into the question now under consideration. The enamel margin is slightly beveled, to remove all short enamel rods or ragged edges, and any practitioner with the slightest operative skill may pack gold into this cavity without the danger of its "sliding off." There is nothing for it to slide off from, and it makes absolutely no difference whether the cavity is in the mesial or distal surface of the tooth.

From the essayist's words we might be led to think that he supposed the axial wall to be curved with the convexity of the tooth (as in Fig. 14) compelling the operator to pack gold around a corner to gain access to the axio-gingival angle. He speaks of the "axio-gingival curve" as being much easier to pack gold against, and in section 29 says, "Curved walls are more conservative of strength than angles." Fig. 15 shows a cavity with a curved axio-gingival line, and Fig. 16 one in which the axial and gingival walls unite at right angles. I submit to you, Which will be more likely to slide off?—

which is the easier to pack gold against? I will admit that Fig. 16 looks ugly and angular, while Fig. 15, with its graceful —ogee, carpenters would call it—curved lines illustrates a thing of beauty, but would not the cavity in Fig. 16, with the gold perfectly condensed into the cavity angles, be more likely to be a joy forever as a seat for a filling that is to withstand stress? A seat made as in Fig. 16 does not expose the lingual and buccal walls to the lateral strain to keep the filling from rocking, as would the cavity in

FIG. 14. FIG. 15. FIG. 16.

Fig. 15. Retention is largely a matter of resistance form, and certainly the cavity in Fig. 15 will not resist stress without deep pits, grooves, or undercuts, and by these the pulp is exposed to greater thermal shock—for it requires more and deeper retention pits to retain a filling in a cavity shaped like that in Fig. 15 than in one like that in Fig. 16, and as far as thermal shock is concerned, a cavity is no shallower than its deepest pit.

I fail to see wherein the five cases cited, as showing patients and test cases with which to prove that extension for prevention is a failure, have any bearing on the subject at issue. There is no evidence to show that any of the fillings were made under extension for prevention rules. The fact that one patient was first cousin to another proves nothing, as heredity is not a factor in caries of the teeth; neither does the statement that "All these cavities will be filled with gold, not inlays, at the proper time," cause any disintegration of the foundation upon which extension for prevention is builded. Nor does the fact that someone made a filling in a cavity in the occlusal surface of a lower first molar of a ten-year-old child, which failed within two years, shatter the superstructure of extension for prevention. There is no evidence to show that the rule for preparing cavities in occlusal surfaces, "including all the imperfections that may be found in the developmental grooves in this surface," was followed, nor that the enamel margins—and especially the mesio-occlusal one—were properly beveled. In fact, we have reason to suspect that these precautions were neglected, because the essayist does not believe in extension for prevention nor in beveling margins.

I have seen three distinct and separate fillings made by an anti-extension-for-prevention operator in the occlusal surface of a lower molar, all connected by imperfect developmental grooves. Is it any wonder that the saying is common in the section of the country in which this method of operating is taught, that the average life of a gold filling is about two years? With all the sins of omission and commission charged up against the disciples of extension for prevention, I can truthfully assert that their operations last longer than that.

It seems to me that there should be a statute of limitations to protect an operator from the consequences of his mistakes so that, after a lapse of fifty years, his sins of ignorance be "remembered against him no more forever."

Of all the atrocities ever practiced under the name of dentistry, the practice of filing V-shaped spaces in the approximating surfaces of human teeth was the

climax. Space does not admit of my giving a thorough description of that method. I will show a cast illustrating this method of removal and prevention as shown in Harris' "Principles and Practice of Dentistry," published before the majority of the members present were born. (See Figs. 17 and 18.) In the earlier years of my practice victims of this outrage occasionally drifted West, one of the universities founded before the Christian era. There is a constant strife between the old stand-pat directors and the progressive element. Whenever the latter wish to inaugurate any modern innovations, they are met by the old stock objection and argument: "These conditions have obtained since the Romans invaded Britain; why should we change them?"

FIG. 17.

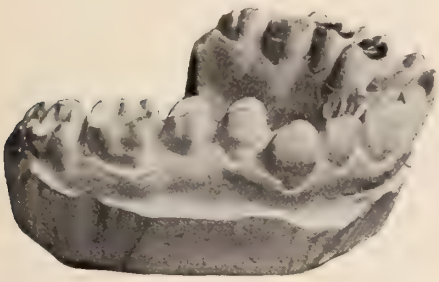
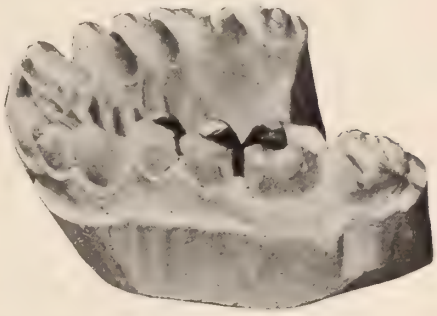


FIG. 18.



Method of filing V-shaped spaces between the teeth spoken of in paragraph 32.

and we were called upon to remove masses of stringy food that had become impacted in food pockets in the subgingival space. In the act of mastication food would pack into these V-shaped spaces between the teeth so tightly that the teeth would separate slightly, allowing the food to be forced into the subgingival space, where it would decompose and cause decay in the concavity of the teeth.

I am surprised that any practitioner in this twentieth century should want to follow another practitioner, though he hail from Philadelphia, back to the methods practiced in 1845. Such progressiveness as this reminds me of the Chinese. A son of mine is holding the chair of mathematics in a university in the province of Chi-li, North China, this being

Though I come from a progressive state and am heartily in sympathy with the sentiment of my state, I have due respect for conservatism, but not that conservatism that is inanition. Is it not possible that opponents of extension for prevention could learn some lessons in conservatism from these followers of Confucius? And, while they are looking that way, shall we not, as progressive, thinking men and students, look ahead instead of to the traditions of the past for light to guide us in our efforts to save the human teeth?

Discussion.

Dr. J. V. CONZETT, Dubuque, Iowa. If I were to make any criticism in regard to the paper, it would be that Dr. Clack wrote it at all. In this day I do not

believe that extension for prevention needs an apologist. It is true that there are men here and there who do not believe in extension for prevention, but I believe that this is because they do not understand it; for as we go to different parts of the country and attempt to explain what Dr. Black means by extension for prevention, we find that the men who before that time were antagonistic and opposed to the principle, after they understand what Dr. Black means, heartily indorse it. One of the first objections raised against extension for prevention by those who do not understand the principle is that it is criminal to cut teeth all to pieces, and I heartily agree therewith. We should not cut one particle farther than is necessary to save a tooth, and extension for prevention only means that the tooth should be cut far enough that it shall be saved. Some practitioners remove the carious portions of a tooth without correcting the condition that caused the caries, and in consequence there will be a recurrence unless immunity has set in. Those who practiced dentistry for any length of time before the practice of extension for prevention was advocated know that patients whose teeth had been cut in the manner indicated returned, after a period of twenty years, perhaps, presenting these cavities in good condition. Now, after a period of fifteen years, I find recurrence of caries around the fillings which during all these years had saved the teeth, not because of properly understood and applied scientific principles, but because the patient had arrived at the period of immunity. These teeth would not have decayed during this period no matter how they were filled, but had I carried out the lingual and buccal walls to the proper extent, there would not have been any recurrence of caries to this day, because at these very points the fillings failed.

After a practitioner has once thoroughly understood and applied the principles of extension for prevention, he will never return to the old method, as it is the easiest way to fill teeth. Frequently, for the patient's sake, men object to cutting teeth in that way, yet patients have told me since I have been practicing this method that they would not want their teeth filled in the old way, because from their standpoint the new way is the easiest.

The question of immunity and of extension for prevention involves the etiology of caries of the teeth. We have learned from the teachings of Miller, Black, and Williams that caries is caused by the invasion of the tissues by a micro-organism which grows under the gelatinous plaque of Williams. This plaque cannot attach itself to the teeth in portions exposed to the excursions of food in mastication, to the movement of the tongue or lips, or to proper cleansing of the teeth with the tooth-brush, but it does attach itself in places protected from the excursions of food by reason of conditions which we are now beginning to understand because of the recent work of Dr. Black. We know that in certain conditions, in which there is perhaps overfeeding or faulty metabolism of some sort, there is precipitated in the mouth and around the teeth glucosin, which adheres to the teeth, followed by the formation of bacterial plaques. The fastening of these plaques on the tooth protects the micro-organisms from dislodgment, and furnishes an osmotic membrane through which the micro-organisms can receive their pabulum from the fluids of the mouth, thus preserving their vitality until the enamel is penetrated. If the

portion of the tooth that can be so attacked by organisms of caries is not removed, we leave the tooth in a condition favorable to caries. In the light of the present knowledge of etiology, when a patient presents teeth which need intervention because of caries, it is our duty to carry the margins of cavities so far that the patient will be able to keep the margins of the fillings clean in every respect. That is all that extension for prevention means. In some teeth it may be necessary to cut to a considerable distance bucco-lingually because of the condition of the approximating teeth, but in a large majority of cases it is not necessary to cut very extensively if the filling is properly contoured and the contact point is properly provided, allowing all lines of the filling to converge toward that point. If we make a proper contact point, the tooth need not be cut very extensively in order to bring the bucco-lingual margins within areas of immunity, because in so doing the margins will be so placed that the food excursions from occlusal to gingival will keep the margins clean.

In my belief the question of extension for prevention is one that is very much misunderstood, because in my experience nearly all the antagonists of this principle, after learning that extension for prevention means simply carrying the margins into an immune territory, which is not as far buccally or lingually as they had formerly supposed, have become disciples of this method, unless they are so old that it is impossible to teach them new tricks. And so I am sure that Dr. McCullough, although I do not know him personally, has attacked the principle of extension for prevention because of a misunderstanding rather than an understanding of the facts of the case, and after he thoroughly understands this principle, he will practice it rather than antagonize it.

Dr. J. B. Pherrin, DesMoines, Iowa. A few days ago there was a gathering of grizzled veterans of the North and South. Many of those old veterans who grasped each other's hands had before been enemies, yet there was a mingling of much pleasure with some grief. At that meeting men met who had fought battles and who recalled the times when the strife was strong; they had met again to rehearse these memories, and they were as much interested in the rehearsal of these events as they had been years ago in the events themselves. Here today we have a rehearsal of a battle that has long ago been fought, and the grievous part of this is that it has been necessary for Dr. Clack to reply to or discuss Dr. McCullough's paper. The lessons learned in past years from the battles between the armies of the North and South are daily taught to the present generation, and so it is with extension for prevention; it would not be long before gold filling with the principle of extension for prevention would be a lost art if someone did not keep up the enthusiasm and such men as Dr. Clack did not step forward to promulgate the proper idea. The young college graduates and the practitioners who learn these lessons see also the inlay, and thinking it much easier, drift into using inlays, and the gold filling would soon become a lost art if this subject were not discussed. Therefore in my opinion it is not necessary to make any apology for Dr. Clack's taking up this subject and trying to prevent the evil effects of wrong teaching.

When I first heard of extension for prevention I received the impression that we would have to cut teeth all to

pieces. A short time afterward I made the acquaintance of a man who taught me the correct principle, his first lesson, which lasted from seven o'clock in the evening until three o'clock in the morning, being on the study of the conditions. This unfortunate paper is simply due to the fact that its writer has not understood the conditions.

One passage in the paper to which Dr. Clack replied, in my opinion, has not been brought out fully, namely, when the first essayist says that the extension of the line or base of filling beneath the gum line in some cases would mean that it would have to be extended almost to the apex of the tooth. We know that in cases of pyorrhea the recession of the gum in many cases has extended far up on the tooth. To those cases, of course, the rule is not meant to apply, and it seems that the essayist of the original paper has not studied the conditions of the cases, but has taken every rule as absolute.

As to the extension of the cavity toward the pulp, it need be extended only as far as is necessary to remove the carious portion and to obtain the proper form for the introduction of the filling.

The question has been raised whether this discussion is of benefit. In my opinion it is beneficial and necessary, because many practitioners have not studied the conditions, and it is requisite to repeat again and again these lessons until they are properly learned. As it has been necessary for centuries to continually preach the teachings of Christ over and over again, so with the teachings of Dr. Black; it will be necessary to continually preach in the years to come what Dr. Black and others have taught us.

Dr. C. W. Strang, Bridgeport, Conn. I would like to ask the essayist one or two questions. First, in what respect does the Black system of extension for prevention differ from the system as practiced and taught by Marshall H. Webb thirty-five years ago? Second, at what age or period in life is it advantageous or desirable to begin the practice of extension for prevention?

Dr. Clack (closing the discussion). I am very sorry that more of the members present did not rise to defend the methods they are practicing. I have the highest respect for the man who has the courage of his convictions and is willing to defend them at any time and place, but I have only condemnation for the man who uses methods of extension for prevention, or any other methods, but is too lukewarm to aid in their defense, and merely sits still and hears his methods assaulted without having the courage to defend them.

I did not write this paper entirely of my own volition. One of the gentlemen has suggested that Dr. McCullough is not present. It is not intended by this paper to criticize him alone, but also those fellow practitioners who were present this afternoon, and many of whom left because they would not hear a criticism of their methods, and did not dare defend them. My attention was continually called to Dr. McCullough's essay, not only by followers of the Black methods but by practitioners from the West who differ from us in their opinions. Friends have said to me: "Here is a man from Philadelphia, the recognized center of the world in regard to education and enlightenment in dental matters, and he maintains that extension for prevention is not only unnecessary, but criminal," and these practitioners were falling back into the old methods because this writer had published in the *Dental Cosmos*, a magazine that we all respect, a paper

attacking the principle of extension for prevention, and it was for the benefit of these practitioners that this paper was written.

In reply to our friend who asked in what way Dr. Black's methods differ from those of Dr. Webb, I, as a follower of Dr. Black—would that I were able to follow him closer and appreciate him better!—honor and revere the memory of Dr. Webb, and when I hear it said that this is nothing new, and that Dr. Webb taught all these methods, I reply that Dr. Black never claimed that it was new. He claimed that he made investigations of fillings made after this method by Dr. Webb and others who used to make these extensions and contours, and that he found fillings so made which had resisted the ravages of caries for a great many years. But we speak of the Black system, because Dr. Webb did not live long enough to systematize this method; moreover, Dr. Webb was not a man who could do that—he was more of a worker at the chair, and Dr. Black is more of an investigator, a compiler, a systematizer. On the other hand, there are many men in this country who are not willing to give Dr. Black credit for his investigations, and who hail Webb, saying: "I am a follower of Webb, and I make fillings according to the Black system," though many of them could not recognize a Black preparation. These are the men who speak up most loudly about this matter. Every intelligent follower of Black reveres the memory of Webb, and many of them are his followers, and deplore the fact that death removed him before he had completed his work, if a man can ever be said to have completed his work. I am sorry that while Dr. McCullough could not be present, some of his friends —because every man has his friends and followers—did not see fit to stand up to the rack and defend the method that he advocates.

Dr. STRANG. The essayist has failed to answer the other question asked, namely, at what age it is advisable to begin methods of extension for prevention.

Dr. CLACK. I have seen fillings in the teeth of children of ten years of age, and a few of the members present have seen fillings made by Dr. Searle in the permanent molars of his own children at the ages of ten and twelve years which are now perfect, the children having grown to manhood and womanhood. It is not so much a question of age. Of course a certain development of the teeth is necessary. I think it is better to defer the application of the principle of extension for prevention until the apex of the root is fully developed. At one time I believed that it was impossible to make a filling in a tooth of a person less than eighteen or twenty years of age, because of the then supposed impossibility of getting sufficient condensation to make a filling that would withstand the stress of mastication, but we have no such difficulty now with our present knowledge of the teeth. While I believe it to be good practice to use some intermediary methods for a few years, with the permission of the Clinic Committee I would like to show tomorrow some twenty fillings that I have made for one patient, who was extremely susceptible. These fillings were made when the patient was sixteen years of age and from that time on. Some of these fillings have been in place now for eleven years, and I present them without having polished them, even on the occlusal surfaces to remove pits—because at the time they were inserted the pericementum was not in con-

dition to withstand shock sufficiently to allow of the condensation of gold so as to prevent its pitting, but enough to prevent the recurrence of caries. I challenge anyone to find any recurrence of caries around these fillings. Not one of them has been replaced, and some of the members present have seen these fillings every year or two since the time they were made, and will witness that they have not been replaced. This patient is not immune, but is still extremely susceptible.

I could not state the particular age at which it would be advisable to begin this work for every patient. I have seen patients sufficiently developed at the age of thirteen, while others are more delicate at that age, when it would not be good practice to subject them to the strain inherent to making such a filling. Very soon after puberty, I think, it is comparatively safe to make these fillings, which depend largely on dexterity of manipulation. In that respect I have nothing to say about the practitioners in the East. We have nothing to teach them in the matter of manipulation of gold, but we have much to learn from them in their delicate manipulation thereof.

The next order of business as announced by the chairman was the reading of a paper by Dr. JOSEPH HEAD, Philadelphia, Pa., entitled "The Necessity for Dental Education on the Subject of Mouth Antisepsis." [See Notice below.]

Section II then adjourned until the next annual meeting.

IMPORTANT NOTICE.

THE Publication Committee exceedingly regrets the necessity for withdrawing Dr. Head's paper from our official Transactions. This was occasioned by the fact that a manufacturing concern, through their attorneys, served written notice that the publishing of certain statements contained therein would be libelous, and that both the Association and the publishers would be held responsible.

The first information of this received by the chairman of the Publication Committee was April 30th. Copies of the full correspondence was immediately mailed the President, the chairman of the Executive Council, and the other members of the Publication Committee, and we all agreed that it was important that our Transactions be distributed to our members at the earliest possible date. In order to accomplish this, and without prejudice, it was our unanimous opinion that the withdrawal of that portion of the paper to which objection had been filed should be authorized. This did not meet Dr. Head's approval, and at his request the publishers were directed to withdraw his paper and publish this notice in our Transactions.

The chairman wrote Dr. Head and the publishers suggesting that they use their best efforts to adjust this in the most satisfactory manner possible, but without success.

PUBLICATION COMMITTEE,
Per H. C. BROWN, *Chairman.*

SECTION III:

Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—Wm. Carr, New York, N. Y.
Vice-chairman—Richard Summa, St. Louis, Mo.
Secretary—L. P. Dotterer, Charleston, S. C.

TUESDAY—July 25th.

The first session of Section III was called to order on Tuesday afternoon, July 25, 1911, at 2.30 o'clock, by the vice-chairman, Dr. Richard Summa.

Dr. Summa. I regret to announce that the chairman of the section, Dr. Carr, is unable to preside over the meetings on account of illness, and on his behalf I wish to thank the essayists and those who are to discuss the essays for their efforts toward making this meeting a success.

Dr. E. E. Haverstick, St. Louis. In view of the fact that Dr. Carr has just undergone an operation and is unable to be here, I would move that we send him a resolution expressing our sympathy and our hope for his speedy recovery.

The motion was carried unanimously.

The first order of business for Section III, as announced by the vice-chairman, Dr. Summa, was the reading of a paper by Dr. R. W. Bunting, Ann Arbor, Mich., entitled "Secondary Calcifications of the Tooth-pulp." [See next page.]

Secondary Calcifications of the Tooth-Pulp.

By RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.

THE question of the value of the dental pulp to teeth which are fully formed is one about which there has been a great diversity of opinion. From clinical observations many have maintained that the pulp was an unnecessary adjunct to a completely developed tooth, while others have been equally insistent that the pulp should be saved in every case in which it was possible. Various investigators have studied the subject in an endeavor to obtain scientific data relative thereto, and the results have been varied. We have the views of Boedecker, Caush, and others, stating that the dentin and enamel of the formed teeth are in vital relation with the tooth-pulp; that the fully developed enamel and dentin are constantly supplied with nourishment from the healthy pulp, and that in case of general bodily illness this nourishment may be depleted and the tooth structures weakened by extraction of calcium salts from their substance. Much of this is controverted by others, among whom are Miller, Black, Williams, and Hopewell-Smith, who maintain that the enamel, when once formed, cannot be built up or broken down by any internal force. Upon the dentin considerable light has been shed by the researches made by Dr. Black on the physical properties of the teeth. By this work it was demonstrated that the strength of a tooth does not depend upon its density or the percentage of calcium salts which it contains, but rather upon the condition of the organic matrix in the dentin. Black showed that dead teeth are considerably weaker than vital teeth containing corresponding amounts of calcium salts.

From these statistics and from clinical observations we must admit that some change occurs in the tooth after the death of the pulp which renders the enamel and dentin more friable and less capable of enduring stress. As to the exact nature of this change we are still in doubt, and at present can only state probabilities.

The dentin is a tissue composed of a calcific matrix deposited upon a fine network of connective tissue. This dentin matrix is permeated by canals containing prolongations of the odontoblasts, cells of the pulp, these prolongations extending to the enamel. In certain teeth these odontoblastic fibrillæ seem to permeate the enamel a short distance by little spindle-like processes known as "enamel spindles." When the pulp dies, there is obviously a degeneration of the connective tissue network and the dentinal fibrillæ of the odontoblasts; simultaneously the tooth becomes weaker. This loss of strength cannot be due to any change in the calcium salts in the tooth. It must, then, be attributed to the loss of vitality of the organic substances of the dentin. We might compare the relation of the organic and inorganic materials of dentin to that of reinforced concrete, the organic fibrils having the property of binding together the mass of calcium salts and increasing its strength and elasticity. When the binding substance is weakened, the whole mass loses strength.

In regard to the enamel, a similar loss of resistance to stress is noted after death of the pulp, and we know from clinical experience that the enamel of dead teeth is more easily detached from the dentin than is that of vital teeth. As there is practically no organic substance in the enamel, we cannot look to that constituent for an explanation of this change. Sudduth offers a theoretical explanation of the fact that the dento-enamel attachment becomes weaker, saying that the area lying between the two structures becomes dried out subsequent to the death of the pulp, and the attachment of these structures is impaired. It may also be possible that the attachment depends to some measure upon the enamel spindles, which lose their vitality and function with the death of the pulp.

From the foregoing we may conclude that a healthy pulp is a valuable asset to a tooth which is to endure direct stress such as that of mastication or of support to a filling. In teeth, however, which are ground down and entirely covered by crowns, little crushing stress is brought to bear upon the dentin, and the danger of fracture is reduced to a minimum; in such cases the pulp is not essential to the welfare of the tooth, and may therefore be removed.

There being, then, a relation between the pulp and the strength and vitality of the whole tooth, the efficiency of this relation will depend largely upon the health and welfare of the vital organ. The condition of the pulp is a variable factor and is affected by impulses of various sources. To enumerate, the pulp is irritated by abrasions, erosion, caries, fillings, fractures, electrical impulses, malocclusion, pericemental diseases, reflex stimuli, and many systemic conditions. By stimuli arising from any of these conditions, hyperemia and inflammatory processes may be set up in the pulp of varying degrees of severity, depending upon the nature and duration of the irritation. Inflammatory conditions of the dental pulp are somewhat similar to inflammatory processes in any embryonic connective tissue, being modified, however, by the fact that the blood-vessels have little or no muscle in their walls, by the absence of lymphatics, and by the inelasticity of the dentin walls which surround it. As in certain other tissues of the body, there is a tendency on the part of the pulp when in the state of chronic irritation to extract calcific material from the blood in relatively large quantities. These inorganic salts are deposited in the form of secondary calcific concretions in the canals of the dentin, upon the pulpal wall of the dentin, or in the substance of the pulp itself. It is the purpose of this paper, then, to consider the various forms of secondary calcifications of the pulp, the causes for their formation, and their clinical significance.

TUBULAR CALCIFICATION.

The simplest form of secondary calcification in the tooth is that of the deposition of organic salts in the tubuli of the dentin. The calcific material is laid down in the sheath which lines the walls of the tubule, being introduced from the pulp through the medium of the odontoblastic fiber lying in the tubule. When the process is complete, the sheath, fibril, and whole tubule is fully calcified, and the lumen is obliterated. Tubular calcification, otherwise known as "transparent zone," is found in the dentin beneath areas of abrasion, erosion, and caries, when the pulp is in a healthy condition. The slower and milder forms of stimuli

are more favorable to its formation than those which are rapid and intensely irritating. It is noted that the largest amounts of tubular calcification result from abrasion and slow caries, while rapid caries and erosion produce much less. As a rule, only those tubuli which are affected by the injury undergo this change. We may find, however, that in individuals who are advanced in years or who are suffering from gout or arthritism, in which conditions the blood is surcharged with calcific material, the teeth will undergo a general calcification of all the dentin, either in the presence or absence of injuries such as abrasion or caries.

Much discussion has been raised as to the therapeutic value of this secondary calcification of the dentin. Perhaps the best work which has been done upon this subject is that of Dr. W. D. Miller. He takes the position that the calcification is an effort on the part of the pulp to inhibit the progress of the invading force. Whether it be the wear of abrasion or the decalcification of caries or erosion, in any case the attacking force meets with a tissue which is not open and porous like normal dentin, but is a solid calcific body, which obviously offers greater resistance to the invading process in its advance toward the pulp. This may be illustrated by a series of microphotographs selected from the collection of the late Dr. Miller, many of which were made by him personally.

Fig. 1.

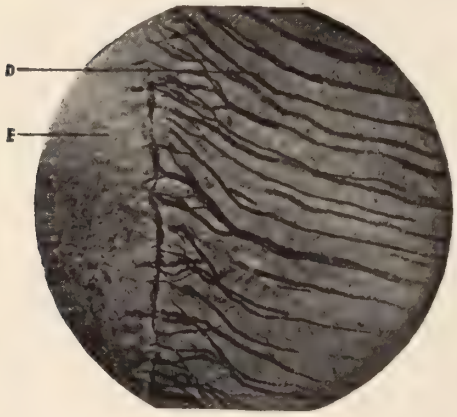
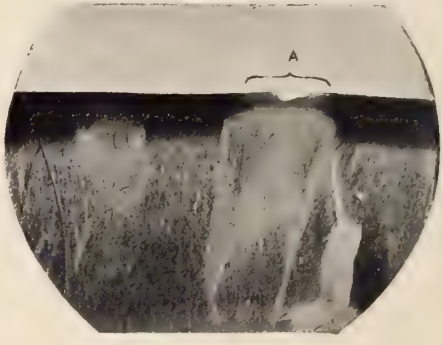


Fig. 2.

Fig 3.



In Fig. 1 we have a picture of normal

dentin at the dento-enamel junction, showing how greatly the tissue is permeated by the canals and their fibers in this area. This branching is, however, confined to this region, the canals of the body of the dentin being unbranched, and amounting in bulk to about one-twentieth of the total substance. The entrance of some of the dentinal fibrillæ for a short distance into the enamel is also evident, as before mentioned.

Fig. 2 presents a picture of a tooth affected with both abrasion and erosion. Beneath each area a change in the dentin is notable, extending to the pulpal wall. This change is apparent in the section because of its difference in refraction to light, produced by the increased density of these areas due to secondary calcifications of the dentinal tubuli. On comparison of the two areas, it will be seen that the zone of calcification beneath the abrasion is much denser than that below the erosion. The pulp has also thrown up a small amount of secondary dentin at a point opposite the former, while none is visible beneath the latter. This bears out the statement that these secondary changes are more readily and more completely formed under areas of abrasion than under those of erosion, other things being equal. It is likely that the irritation of the acids of erosion are so severe that degenerations are produced in the pulp, rather than constructive changes.

The resistance which the transparent zone offers against acids is seen in Fig. 3, in which there is shown a section of dentin a portion of which has undergone secondary calcification. As an experiment the section was placed in acid until

FIG. 4.

—*Miller.*

decalcification took place. Note that this calcified area (see A) has been decalcified

FIG. 5.

to a lesser extent than the surrounding dentin, showing a marked retarding action on the part of the solidified dentin. have been complete, these secondary changes have a marked effect upon the advance of the carious process, inhibiting its progress toward the pulp. This may be illustrated by Fig. 4, in which we see a cavity of caries in the occlusal surface of a molar, the cavity having extended some distance laterally beneath the enamel, the caries process, however, having advanced a relatively short distance toward the pulp. It seems very possible that this impeding of the progress of caries pulpward is due to the heavy secondary calcifications formed in the dentinal tubuli which have been attacked. The transparent zone is therefore of great benefit to the tooth, in that it conserves the dentin from loss and delays or prevents the exposure of the pulp. It also has another influence of a beneficial character in that the dentin which is thus calcified offers an increased resistance to the transmission of thermal stimuli from the surface of the tooth to the pulp. Considerable irritation is set up in the pulp by

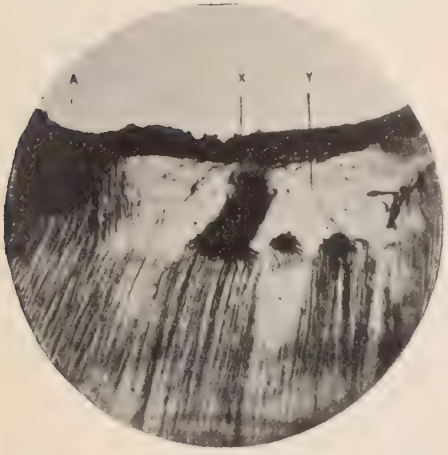
FIG. 6.

FIG. 7.

In many cases of caries, then, when its progress has been slow, the pulp has been healthy, and the dentinal calcifications a large number of filling materials which we commonly use in the repair of carious teeth. All the metals conduct heat more

or less readily, and a filling with a high conductivity, if placed in a cavity which approaches the pulp, will constantly irritate the latter by undue stimulation.

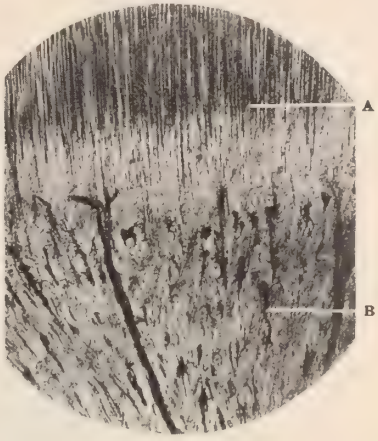
FIG. 8.



This irritation will be less severe if the dentin overlying the pulp is dense, having undergone sclerotic changes. This principle will also apply to all filling materials which by their nature are irritating to the pulp. Such fillings as the oxyphosphates of copper and zinc, which contain an excess of acid, are intensely irritating, but if calcification has taken place, the pulp is protected from excessive stimulation. This protective action no doubt saves a large number of pulps from death beneath our ordinary filling materials.

In this connection, by reference to Fig. 4, it will be seen that although the caries has been extensive, the calcification of the dentinal tubuli has been confined to those which are directly affected by the caries. Portions of the dentin which lie on the lateral surfaces of the tooth have dentinal tubuli which are still patent, containing vital prolongations of the pulp. In case this tooth should be ground down for the purpose of setting a gold crown, these tubuli and fibrillæ would be cut. When the crown is set, soft cement with an excess of acid is

FIG. 9.



flowed about this ground surface, producing an irritation of the cut dentinal fibrillæ. This irritating action will take place on the whole circumference of the tooth, completely girdling the pulp at a

FIG. 10.

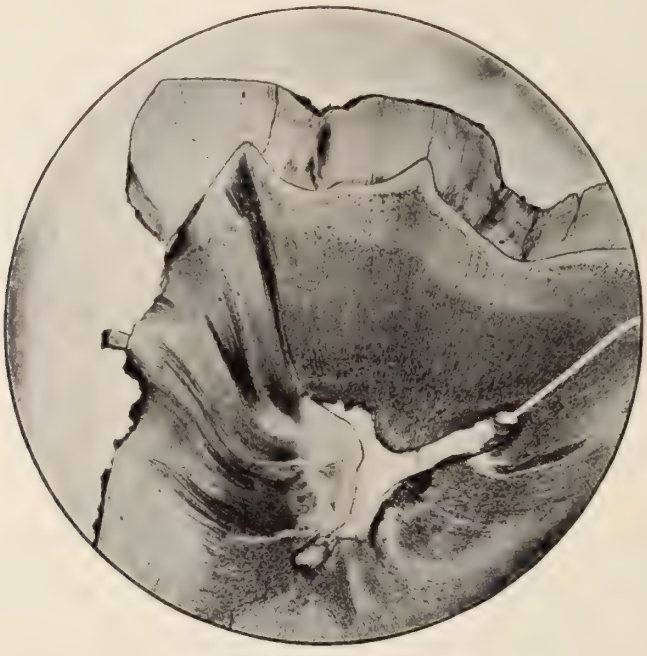
part at which it is not prepared to resist. This excessive stimulation to the pulp in a large number of such cases results in the degeneration and death of that organ, so that although occlusal or approxi-

mal fillings may be inserted relatively near to the pulp in teeth which have been affected by abrasion or slow caries, the operation of crowning these vital teeth is unsafe and hazardous in a large percentage of cases.

SECONDARY DENTIN.

In conjunction with the secondary changes in the dentin usually a deposition of calcific material in the pulp chamber takes place. These deposits, produced by irritation or stimulation of the pulp, may take on a number of different forms. There are three factors which determine the character of the deposit, namely, the health of the pulp, the intensity of the irritation, and the amount of calcific content of the blood. We find that when the pulp is healthy and the stimulation is mild, new dentin of good quality will be deposited upon the pulpal wall of the dentin, and we speak of this as "secondary dentin." In proportion to the increase of the severity of the irritation or to the decrease in the health of the pulp tissue, there will be a corresponding departure from normal in the structure of the newly formed dentin. The fibrillæ will decrease in number, until they are entirely absent, and forms of calcific deposit may be seen which are simply masses of calcareous matter having no dentinal structure. These forms of deposits have been classified by Hopewell-Smith as "adventitious dentins." They may be homogeneous or hyaline, fibrillar, areolar, or laminar, depending upon the manner of their formation. These concretions are deposited at a point in the dentin corresponding to the proximal ends of the fibrillæ receiving the stimuli, and as a rule are confined to this area, so that an occlusal cavity

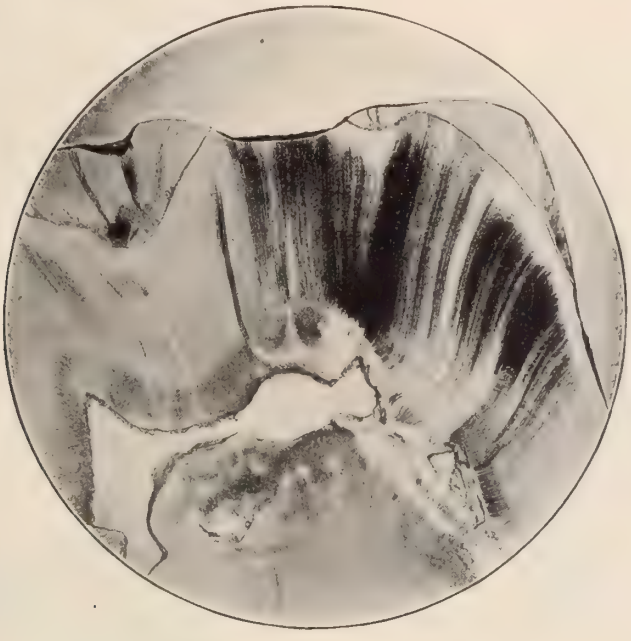
FIG. 11.



—Miller.

will stimulate the growth of secondary dentin upon the roof of the pulp chamber, while the lateral walls will not be affected. There are many exceptions to this rule, in that in old age, in long-continued irritations of a mild type, in the presence of a gouty or arthritic diathesis, or in case of reflex stimuli, the whole surface of the pulp chamber may be covered with secondary dentin, thus diminishing the size of the pulp cavity. This process may continue until the pulp is retracted to a considerable extent, and the chamber and root-canals are in some instances completely obliterated. An example of this was seen lately in our clinic in the case of a young woman who presented a tooth for treatment which was dark in color, but exhibited no signs of injury of any kind. The history of this case was that the tooth had turned dark shortly after a malposed tooth had been extracted in its immediate vicinity. When the pulp chamber of the tooth was opened, it was found that the dentin was discolored, and the root-canal was entirely filled with a dense deposit as far apically as it was possible to drill with safety. Undoubtedly this was a case of reflex stimulation producing extensive secondary deposits in the pulp.

FIG. 12.



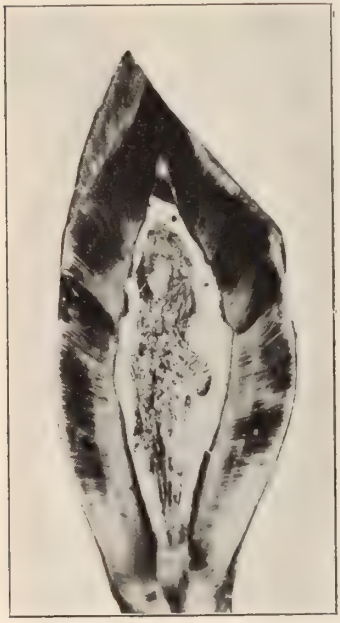
—*Miller.*

Contrariwise, it is seen that some pulps are unable to form secondary dentin or undergo constructive changes of any kind which might protect them. This occurs in case the stimulus is overstrong, or if the pulp has been injured by previous disease, reflex stimuli, or a general lowering of the tone of the whole body. In all such cases the pulp does not react in a constructive way, but rather undergoes degenerative changes. There is, then, no hard-and-fast rule for the amount of deposition in a given case,

so that one cannot judge the size of a pulp chamber with certainty until he has gained entrance into the dentin and approached the vicinity of the pulp.

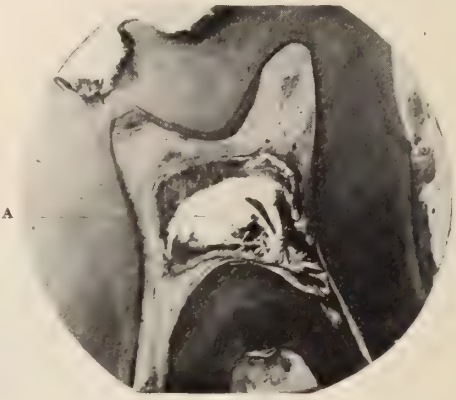
The question then arises as to how much value these deposits may have in the economy of the tooth. When the secondary dentin is deposited below an area of abrasion, erosion, or caries, the distance which the invading process must

Fig. 13.



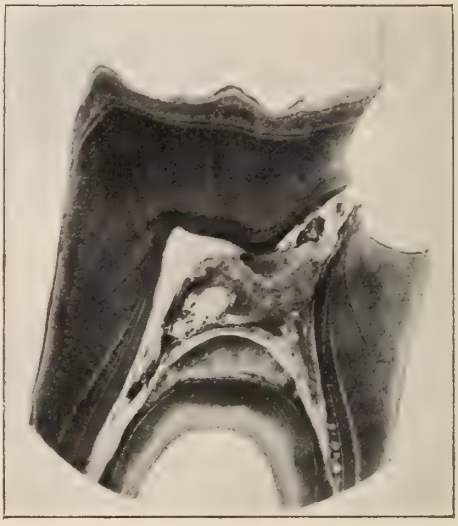
travel to reach the pulp is increased, pulp exposure being thus delayed. It is likely that the new dentin has an inhibitive action upon stimuli such as heat, cold, and acids, and certain forms thereof offer considerable resistance to the progress of the organisms of caries. The pulp is often protected against exposure by this new material, and it is frequently possible to successfully place a filling in the repair of a carious process which has extended through the primary dentin and has its boundary lines touching upon secondary dentin, the pulp being vital. So, also, in the placing of fillings which

Fig. 14.



are near enough to the pulp to produce irritation, if conditions are favorable the pulp will build a barrier under the fill-

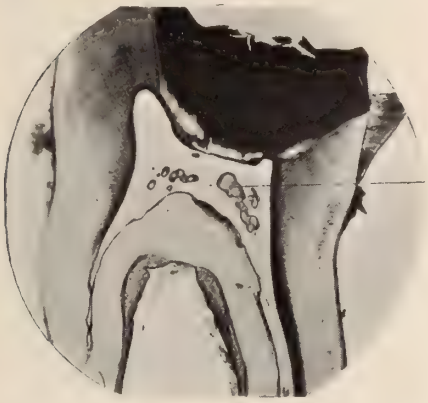
Fig. 15.



ing, thereby protecting itself from undue stimulation. What has been said as to the beneficial effects of this process can

only be applied to those formations of secondary dentin which are of a good order and regularly formed. The adventitious dentins have no regular mode of deposit; they are not impervious to bacteria, and by their irregular deposition often seriously interfere with the pulpal circulation and vital activity. Secondary dentins, when they have been laid down over the whole surface of the pulp and extend into the root-canals, as

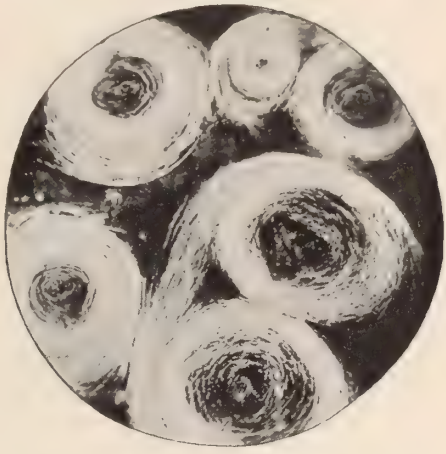
FIG. 16.



is sometimes seen in chronic cases, may narrow the lumen of the canal to such an extent that the extirpation of the root filaments may be seriously interfered with. So we may say that a good grade of secondary dentin is of great benefit to the tooth. It frequently affords strength to a weakened tooth and protects the pulp, thus tending to prolong its life; but the irregular and adventitious formations of dentin are more of a menace than a boon, since they interfere with the circulation of the pulp and tend to produce its degeneration and death.

In Fig. 5 we see a longitudinal section of an incisor which has been worn off by abrasion to a slight degree. Beneath the abrasion there is a transparent zone, and below this a pyramid-shaped plug of secondary dentin. This is a very common picture in cases of small abrasions. We see, however, that a considerable layer of new dentin has been formed over the whole surface of the pulp chamber, diminishing its size. The new dentin is of a very good order, being as well formed as the primary dentin. It is unusual that so small an injury to

FIG. 17.



a tooth should result in so large a deposition, but it is likely that the supply of calcific material in the blood was abundant and conditions were favorable in this case for the formation of new deposits.

A similar case is seen in Fig. 6 in a somewhat higher magnification. The pulp chamber has been considerably diminished in size by a good grade of secondary dentin. One could not say from the slide whether the formation resulted from some injury other than the abrasion shown, from old age, or some reflex stimulation.

In Fig. 7 we see an extensive deposit in the pulp chambers of two lower incisors. The new dentin is of a fibrillar

order, but the fibrils are few in number and not regularly placed, so that the adventitious dentin in this case is of a grade inferior to that in the preceding cases. In each case the whole bulbous portion of the pulp chamber has been filled, and the pulp has receded to the root-canals, at a level with the gum line.

The variance in the structure of the deposits may be seen in Fig. 8, a very

FIG. 18.

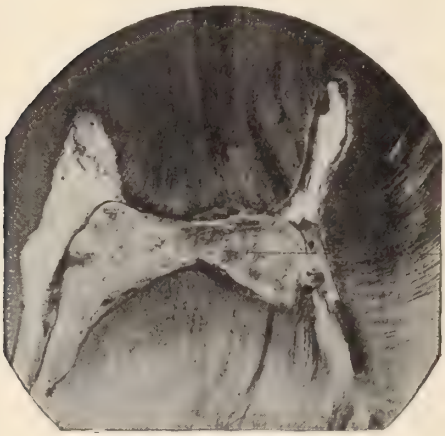
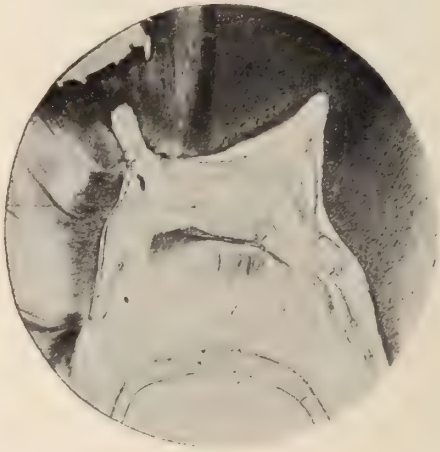


FIG. 19.



fortunate section, which happened to include several varieties of secondary dentin. The primary dentin is shown in the lower portion of the figure, a layer of secondary dentin above. The new dentin will be seen to vary from the primary one in that some portions contain tubuli, as at A, which are like the normal dentin and nearly as regular in formation, while at X and Y the tubuli are irregular, tortuous, fewer in number, or entirely absent.

An illustration of a still poorer grade of dentin formation may be seen in Fig. 9, in which the primary dentin is seen at A, the secondary at B. The new dentin is of the areolar variety, being poorly calcified and containing large spaces which would furnish admirable breeding-places for bacteria should these gain entrance. Such deposits are hurriedly formed by a pulp which is over-stimulated, and are of little benefit to the tooth.

Many instances may be shown of extensive dentin deposition below fillings, as in Fig. 10, in which the pulp is receding beneath a filling and protecting itself from exposure to the recurrent caries which is present. In Fig. 11 an excessive deposit of new dentin is present, the first layer formed being of a good order, while the layer that formed later is of the adventitious variety. This immense deposit, resulting in an almost complete obliteration of the pulp chamber, is probably the result of senile changes, as the injury inflicted upon the tooth by the caries shown in the slide is not sufficient to stimulate so great a formation of secondary dentin. A similar extensive formation of secondary dentin beneath an area of abrasion is shown in Fig. 12. It can readily be seen that in such cases as the last two there is a great increase of dentin and a consequent diminution of

the size of the pulp, so that much more extensive operative procedures can be employed in such a tooth than in a normal one.

As has been said, not all pulps, even though they be still vital, react to stimuli which induce the formation of constructive and protective dentin. For instance, in Fig. 13 we see a section of an upper canine the entire lingual surface of

In Fig. 14 we see a molar with a coronal cavity in which the pulp is nearly exposed, and yet the pulp chamber is of full size, no secondary dentin having been formed. This pulp had also degenerated, as is shown by the fact that an abscess may be seen in its substance (A). In Fig. 15 an exposure of the pulp has been effected by approximal caries, no secondary dentin having been formed. As

FIG. 20.

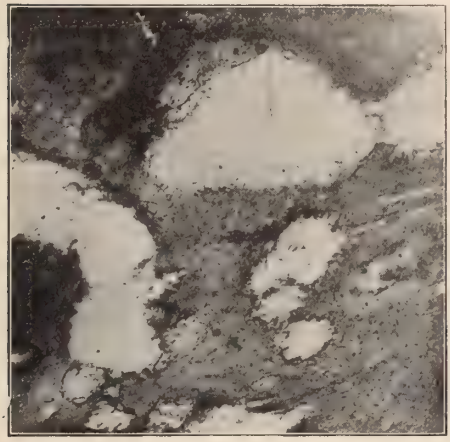


FIG. 21.

which has been extensively abraded, so that practically all the enamel has been worn off. Upon examination of the pulp chamber we see that it is practically of full size. The only constructive change apparent is the formation of a very small plug of secondary dentin in the coronal apex of the pulp. This was probably formed very early in the process of abrasion, as a reaction to the first injury. Then the process ceased, and no further protective deposits were formed. We can see, however, in the pulp itself the record of a degeneration which has taken place, resulting in the formation of pulp-stones in the pulp substance. The irritation then stimulated the pulp not to constructive but to degenerative changes.

in the former case, degeneration of the pulp and formation of an abscess in its substance has been produced.

These observations show that there is a great variance in the reaction of pulps to stimuli, dependent upon the health of the pulp and the health and age of the individual. A stimulus of a mild character may produce constructive changes of a protective nature, but if this stimulus be increased, the pulp may cease to repair, undergoing degeneration instead. So, also, an irritation which will produce constructive changes in one tooth may cause degeneration in another.

PULP-STONES.

Degenerations of the pulp due to stimuli may assume a number of forms, many of which are similar to inflammation and death of other tissues of the

body, but, as has been mentioned, these degenerations tend toward calcification, *i.e.* the formation of various kinds of concretions in the substance of the pulp. One of the commonest forms is that of pulp-stones, which are irregular nodules of calcific material varying in size from minute granules to large masses which fill the pulp chamber. In Fig. 16 we see a group of small concretions lying in the pulp tissue. This case presents an early stage in the formation of pulp-stones, which might have grown and united to form a mass of considerable size had the process continued. All such masses have their beginning in a group of dead cells, which seem to have an attraction for the calcific material in the blood. These then form a central nidus about which the calcific material is deposited in concentric layers. A high-power photograph of such a pulp-stone is shown in Fig. 17, in which the concentric arrangement of the deposit is seen.

By continued growth the pulp-stones may attain such a size that they seriously interfere with the circulation of the blood, and produce pressure upon the sensory nerves of the pulp. As a rule pulp-stones are not attached to the wall of the pulp, but are movable in the tissue. In many instances, when the stone is large, it may act as a valve, which is displaced to allow the blood to come into the pulp chamber and then drops back to position, and in so doing shuts off the exit of the blood, resulting in a continued internal pressure in the pulp. By this mechanical and physical interference with the functions of the pulp considerable disturbance is set up, and pain, either direct or referred, is produced.

Fig. 22.

Fig. 23.

In Fig. 18 we have an instance of the occlusion of a pulp chamber by secondary dentin and a pulp-stone, and in Fig. 19 we see the same result produced by less secondary dentin and a larger pulp-stone. In both cases almost complete atrophy of the pulp has occurred in the chamber, and the pulpal portions situated in the root-canals are probably in an advanced state of degeneration. In no sense can these formations be looked upon as beneficial, but they are analogous to the calcific degenerations taking place in other tissues of the body.

CALCIFIC DEPOSITS IN ROOT-CANALS.

Pulp-stones do not form or extend into the root-canals to any considerable distance, being confined as a rule to the pulp chamber. We often find, however, calcific degeneration taking place in the canals of both single and multi-rooted teeth. These formations consist usually of rough, irregular deposits of calcific material, beginning in areas of degeneration by the deposition of small granules. These granules increase in number and by uniting in groups form masses of various shapes and sizes. The deposits may be round, oblong, or irregular, and of sufficient number to impart rigidity to the pulp tissue, so that a pulp affected with such a degeneration will often be harsh and stiff, and may be removed from the canal in one piece. Figs. 20 and 21 present two cases of calcific degenerations of the pulp such as may frequently be met with.

Should these nodules become very large, or become attached to the dentin, as is the case in Fig. 22, A, they might offer considerable difficulty in the extirpation of the contents of the root-canal. In this connection it might be of interest to note the peculiar formation in a root-canal shown in Fig. 23. At A we see a large concretion resembling adventitious dentin which has formed in an excavation of the primary dentin. This may have been a developmental defect in the dentin or an excavation of normal dentin by odontoclasts under irritation; in either case, the subsequent filling of the defect was connected with excessive action, so that the new formation extended out into the root-canal. The extension pulpward has been so great that the lumen of the canal has been practically occluded, and in such a case it would be difficult to remove the contents of the canal beyond this obstruction. It is not certain how frequently these various canal concretions occur, but these, as well as pulp-stones proper, are doubtless the result of chronic irritations; they are a menace to the health and function of the pulp, and increase the difficulty of pulp extirpation.

We have seen, therefore, that the calcifications produced in and by the pulp may be beneficial to the pulp and to the tooth, or they may be detrimental to the pulp and useless to the tooth. Whenever we make an operation upon a tooth, we must, whether we realize it or not, take into account the calcific depositions. If calcifications are present and they are of a good order, we may extend our reparative measures much deeper into the substance of the tooth than otherwise. If protective calcifications do not occur, the pulp is readily exposed, which necessitates its removal. The presence of pulp-stones and other calcific deposits of a non-protective order manifests itself by neuralgic and referred pains, requiring pulp extirpation. We should therefore bear in mind the relations of these concretions to our clinical procedures, judging the depth of dentin by the history of the case, the general appearance of the patient, and by carefully testing the reactions of the pulp to stimuli, by which means we may determine the effect which the artificial medium we insert will have upon the pulp. By such observation many healthy pulps may be saved to lend strength and vital force to the teeth, and many diseased or useless pulps will be removed.

Discussion.

Dr. MARCUS L. WARD, Ann Arbor, Mich. After reviewing the opinions of

various writers regarding the value of the pulp to the tooth, the essayist says: "From the foregoing we may conclude that a healthy pulp is a valuable asset to a tooth which is to endure direct stress such as that of mastication or of support to a filling. In teeth, however, which are ground down and entirely covered by crowns, little crushing stress is brought to bear upon the dentin, and the danger of fracture is reduced to the minimum; in such cases the pulp is not essential to the welfare of the tooth, and may therefore be removed." From this we may infer that the essayist is willing to draw the line of distinction more plainly between when and when not to devitalize.

From the inception of crown and bridge work in dentistry, there has been a tendency on the part of the profession to construct such work over vital pulps. As conditions have demanded more of this work and as advanced methods of construction have facilitated its application, there has been an increasing number of adherents to the belief that the pulp should be removed in most cases where crowns are to be applied. Even the most enthusiastic of the specialists in this work admit, however, that the pulp should not be removed, even for crown work, until some time after the roots are fully formed, and the apical tissues are adapted to them. Most of these men admit, also, that in a few cases, mostly in older people, there is enough tubular calcification to admit of the preparation of the root and adaptation of a crown without much discomfort to the patient or the apparent likelihood that such changes will take place as the essayist has brought to our attention.

In most practices these two exceptions to the rule that pulps should be removed for crown work and preserved for filling operations form quite a minority of the number of cases demanding crowns or bridges. Those who have been so reluctant to devitalize teeth for crown work often make the claim that they do not have any bad results from placing crowns over vital pulps, but if the opinions of our foremost bridge workers are to be considered, it would seem that these men either do very little crown and bridge work or they do not see their results after such work has been put into use.

Dr. M. L. Rhein, for instance, says, in the *Items of Interest* for August 1910:

> What is the effect of a gold shell crown cemented over roots containing a living pulp? A careful investigation of the clinical methods in vogue at the present time, as compared with years ago, shows a constantly increasing ratio of pulp removal where an operation of this kind is to be performed. This is unquestionably the result of clinical deduction from the large number of alveolar abscesses that have been caused by such procedure. In a lecture before the New Jersey State Dental Society, given in July 1908, and published in the *Items of Interest* for November 1908, a number of radiographs were presented for the purpose of showing the effects produced by placing such caps over teeth having living pulps. A favorite argument of those who still cling to this form of practice rests on the assertion that a certain percentage of cases of this kind have been under their observation for a number of years without any resulting alveolar abscess. The hypothesis that such operations are non-injurious is not based on sound pathological principles, when a careful consideration is given to the diseased condition that ensues from such irritation of normal pulps. Skilful radiography of many of these alleged successful cases would show an astonishing proportion of pathological conditions that are not suspected from external appearances. The gold cap, acting as an irritant, produces an inflammatory condition of the surrounding parts. The results of such inflammation can never be accurately predicted.

Dr. Fred A. Peeso, in *Items of Interest,* May 1910, under the title "Crown and Bridge Work, Past and Present," says:

As to the crowning of teeth with vital pulps, I think there has been a change from the early days when it was considered almost a crime to destroy the pulp, if there was any possible way of avoiding it.

Dr. Clarence J. Grieves said in *Dental Summary,* September 1910:

Pulp devitalization and clean root surgery without damage to the vital apical cementum and the peridental membrane are the very foundations on which modern dentistry is reared. While it may not seem desirable in perfectly normal teeth, the question resolves itself into, first, whether we can do clean root surgery, and if we can, next, whether a few pulps are to be balanced, in value to the whole human economy, as against the masticating powers of a larger bridge.

Dr. Hart J. Goslee says in his book on crown and bridge work:

For years no special thought was given to this feature, and such teeth as seemed to indicate restoration by crowning were treated much in the same manner as though fillings were to be inserted. The frequency of subsequent troublesome manifestations, however, including the ultimate death of pulps with the attending consequences of such pathological conditions as virulent peridental inflammations and alveolar abscesses, have since caused the subject to be more carefully considered, until it is now most generally conceded to be a safer precaution, in a great majority of cases, to destroy such pulps as a prophylactic procedure, as well as to facilitate the necessary mechanical preparation, when the crown is to entirely cover the end of the root.

Dr. I. N. Broomell in *Cosmos,* April 1910, under the title "The Adventitious Effect of Large Masses of Gold in Contact with Tooth Tissues," says:

Ever since the introduction of crown and bridge work into the dental profession there has been more or less discussion in regard to the deleterious effect of large masses of gold in contact or nearly in contact with vital tooth tissues. Some operators have contended that no bad results would follow such operations, while others have been equally confident that the good offices of the supporting teeth would be naturally interfered with by completely or partially boxing them in with gold.

The former class, true to their convictions, have not hesitated to attach large or small bridges to vital teeth either by partial or entire gold caps, while the latter class have invariably devitalized the pulp before performing similar operations.

Clinical experience in general in regard to the ultimate effect of these operations has been such that deductions widely at variance have been arrived at. We have all had cases in which the vitality of the pulp has been lost in the course of time, under partial or full gold caps; likewise we have also had many cases in which under similar conditions the pulps have remained *apparently* undisturbed. In view of what it is proposed to relate in this paper, the qualifying word in the foregoing sentence cannot be too forcibly emphasized, that is, the pulps are *apparently* undisturbed.

As a result of the microscopic study of a number of cases it is proposed to show that almost invariably the pulp tissue, and as well the enamel, dentin, and alveolo-dental membrane, are all more or less affected in various ways by such unnatural surroundings. Among the morbid effects produced are hyperemia of the pulp, dry gangrene of the pulp, calcification of the pulp tissue, sclerosis of the bloodvessels of the pulp, atrophy of the pulp, pulp nodules, secondary dentin, expansion of the dentinal tubules, with corresponding bulging of the dentinal fibers, pathologic pigmentation of the enamel and dentin, non-carious destruction of the enamel, as well as destruction by caries and perhaps molecular change in this tissue. Any one of the foregoing may be the primary affection after which a train of pathic conditions may ensue.

One would infer from these quotations that there is but one course to pursue in the majority of cases where large masses of foreign materials are to be brought into contact with the dentin. The clinical experience of Grieves, Goslee, and Peeso, together with the radiographs and sections of the essayist, Broomell, and Rhein, should be evidence enough to cause more of the profession to heed their warning.

The question of when and when not to devitalize seems to be so difficult of

comprehension that practitioners often permit crowning operations to go undone, giving the preference to other operative measures. The result is that in such practices there are several patients who are deprived of some of the advanced resources of modern dentistry. There seems to be no further question that the pulp supplies the organic matter, in the dentin at least, with vitality, and the loss of the pulp involves loss of organic matter and decrease in strength. But of what especial interest to us is the strength of a tooth that is to be crowned! The factor of greatest importance is whether the root will be retained as well as if the pulp is removed. The evidence we have will bear out the assertion that such a root will be retained far better. If we are willing to follow the advice of our leading exponents of crown and bridge work and our pathologists, our course concerning devitalization for crown work is well outlined. We will devitalize for crown work, but the question remains how to proceed in inlay work, especially in gold inlays. Dr. Broomell's statements concerning the adventitious effect of large masses of gold in contact with the dentin have been indorsed by the essayist, and practically the same is true of the article by Dr. Rhein referred to. For no other operation is good tooth tissue more necessary than when an inlay is to be inserted, and to be of such quality the tissue must be vital. It would seem from this that our course is clear and defined for crown work, but in fillings, and especially gold inlays, we must rely upon our judgment as to which will produce better results for our patients—a devitalized tooth gradually decreasing in strength, with the absence of the conditions that have been called to our attention by the essayist and some of our other pathologists, or a vital tooth maintaining a greater part of its strength but which is infected.

Dr. H. L. Wheeler, New York, N. Y. I want first to express my very high appreciation of the value of this paper and the thoroughness with which the work has been done.

It occurred to me upon studying the illustrations sent to me by the essayist and upon seeing them on the screen today, that possibly an explanation of why the enamel is more readily cleaved from the dentin is indicated by the dark line running transversely through the dentinal fibers. This line possibly represents organic material and cemental substance which holds the enamel to the dentin. If this be true, it can readily be seen how the tooth built of inorganic material and the protoplasm of the dentinal tubules would lessen the strength of the contact or union between the enamel and the dentin. Of course, the destruction of the spindles extending into the enamel would be another cause for the weakening of the dentin as well as the enamel. It also occurred to me while listening to the paper that, if some means could be devised for obtaining skiagraphs of teeth showing the contents of the pulp chamber as plainly as those shown upon the screen, the difficulties of the diagnosis of a great many obscure cases of neuralgia and other disturbances about the head and face would be immediately solved. Here is a field for some ingenious dentist. We are often baffled by obscure cases which are due to such chronic pulp inflammation as has been shown to us by the essayist, and in which we are uncertain as to which pulp and tooth is the seat of the trouble. The individual who can show us the way to determine correctly the causes of such

difficulties will confer a boon upon humanity.

Some years ago it was my privilege to examine about fifteen hundred skulls of prehistoric natives of this continent—by prehistoric I mean belonging to a period before this country became known to civilized man—and it was remarkable in what a large proportion of these skulls, which were evidently those of natives of forty years of age or more, the teeth were worn down practically to the original limit of the pulp chamber; in almost all of these cases secondary dentin had been formed. Only occasionally was it evident that the pulp had degenerated rather than formed secondary deposits of dentin, and, as was plainly shown, an abscess had developed. The number, however, in which degeneration of the pulp had taken place was very small proportionately, doubtless much smaller than in the present generation, because these individuals of prehistoric time lived a simple and primitive life and ate very simple foods, requiring strenuous mastication. They did not have the doubtful advantage of machinery and cold-storage plants and various accessories by which we obtain foods that can be swallowed whole.

In connection with the essayist's investigations, the study of exostosis at the root end, which is also responsible for serious neuralgic disturbances, should be elaborated upon, as such a study would be very valuable in making a diagnosis in these troubles. In a practice extending over twenty years, I have repeatedly observed in multi-rooted teeth that in two canals no calcification of the pulp had occurred, while in the third, usually the palatal canal of upper molars, the pulp was entirely calcified, and I have been able to withdraw it as a long and thin bone-like spiculum, so strong that it could not readily be broken between the fingers. If such teeth are filled no pus will be formed, as the amount of organic material left in that root-canal is so small. The pictures shown by the essayist have suggested to me that some of our distinguished colleagues who claim that they invariably remove every pulp thoroughly to the end of the root and fill the canal accurately must have met with many cases of pulp degeneration in which decalcification was going on. A great many times I have had the misfortune not only to be unable to remove pulps as thoroughly as I desired, but sometimes to break the end of a broach, although I am particular never to put an instrument revolving in an engine in a canal. I always manipulate root-canal instruments with my fingers, but in spite of that I have encountered trouble, and the essayist's pictures explain the reason therefor. Even if proper care is taken in drilling a supposedly straight canal to enlarge its orifice, the point of the drill will sometimes disappear. In such cases I do not try to remove the fragment, unless infection sets in, because I do not wish to run the risk of breaking another instrument. Dr. Callahan's method suggested some years ago as to the use of hydrochloric and sulfuric acid is a boon in such cases.

If Dr. Bunting continues his excellent work, he may perhaps devise some means of diagnosing these cases of calcification, thereby rendering a very great service to the profession.

Dr. H. M. Semans, Columbus, Ohio. Dr. Bunting has explained in a very simple and clear manner the reasons why the pulp remains after complete calcification of the tooth has taken place. Many dentists are accustomed to speak

of the pulp as being absolutely unnecessary after this initial complete calcification, and are apt to operate accordingly, although they are quite familiar with the fact that the pulp possesses the latent or active—as the case may be—power through its odontoblastic cells to build up additional dentin as well as to solidify the dentinal tubules. The opinion seems to prevail that by this formation of secondary dentin nature takes care to ward off future dental troubles, but that dental art can dispense with the need of this activity. In his paper and by the accompanying photographs the essayist has clearly shown that nature attempts more or less successfully to take care of the ravages of time and disease, but also that mechanical art alone does not suffice to conserve the teeth. Dr. Bunting explains very clearly how and to what extent a cavity must be prepared so as to still preserve the normal building activities of the pulp, also what kind and by what manner of means the various filling materials should be used. He furthermore suggests that we should properly diagnose this building activity on the part of the pulp and the probability of tubular calcification as well as secondary dentin, and be governed accordingly in our operative measures.

We are all familiar with methods of medication by phenol, formaldehyd, iodoform, and various forms of conserving pastes used in most cases for the purpose of sterilization and reduction of pain, but we should also know whether this or that drug is suitable for inducing an overstimulated pulp to resume its proper constructive function. Almost all dentists use medicaments for the relief of sensitive dentin or the reduction of inflammations of the pulp without having a clear idea of the effects produced. The essayist's paper illustrates the need of a very much greater knowledge of the pulp and its functions after the initial complete development of the tooth, and should awaken new interest in the important question of pulp conservation.

Dr. Geo. H. Wright, Boston, Mass. I would like to ask whether the grinding down of a root for the fitting of a crown can cause calcification, and whether areas of absorption are found in the apical regions of crowned teeth which are subjected to a great deal of masticating stress; and whether, if this be the case, there is any evidence of calcific deposits outside of the tooth itself, *i.e.* of excementosis? Not having followed this line of study for some years, I would ask whether modern histology has any knowledge of the source of nutritive supply of the tooth outside the root-canal, that is, through the pericementum, the cementum, and possibly by way of the dentinal tubules. If such a source of supply exists, does it not account for the retention of teeth after the pulp has been removed?

Dr. W. R. Clack, Mason City, Iowa. It seems to me that we are sometimes confused as to whether the deposition of secondary dentin is the cause of a disease or the result. I am only relating my impressions received from cases that have come under my personal observation, and am not trying to find fault with anyone's theory. The deposition of secondary dentin due to mechanical abrasion is in my opinion more important than that which may be said to be due to irritation of the pulp by the infiltration of acids. Dr. Wheeler, in speaking of the prehistoric races of this country, raised a strong argument, but in my opinion he did not carry it far enough. I was reared among the American Indians. I have hunted for months with them, and considering

the manner in which they chew their food and the quality of the food they eat, the mechanical abrasion shown in the teeth of these people is not at all surprising. Under our present conditions, children after being weaned eat foods that are not only ground and ready for the stomach but almost predigested. They have no use for their teeth, and nature, abhorring the disuse of any function, often fails to develop these teeth fully. The infiltration of acid in rapid caries is too fast to allow nature to throw out such secondary dentin as would be of any particular use. I wish to differ from the essayist in regard to thermal shock through a large mass of gold being due to the gold. Such shock is induced only in very large cavities, where in my opinion the dentin, although apparently sound, has been permeated by the acids of caries to such a degree as to make a very good conductor of thermal shock to the pulp. I have very little fear of thermal shock through absolutely sound dentin that may have been reached by cutting away sound enamel upon the principle of extension for prevention. I have little fear of thermal shock in such a cavity, but I have seen disastrous consequences from thermal shock in teeth in which the acids of caries have penetrated to the pulp previously.

In one of the pictures the deposition of secondary dentin was shown. I wish to ask the essayist whether it is not possible in a multi-rooted tooth, especially when a canal is narrow, crooked, and constricted, that this dentin never reaches the pulp chamber? I have seen many teeth, and I hope to show one, in which the deposits of secondary dentin have never reached the pulp chamber, while the roots were filled therewith up to the apex. In cases where the secondary dentin is deposited upon the pulpal wall, beginning there and attaching itself firmly to the dentin of the tooth and filling the pulp chamber, this secondary dentin will be of benefit to the patient, but the kind of secondary dentin which is deposited only in patches causes trouble. In attempting to anesthetize a pulp by pressure anesthesia, every practitioner has encountered difficulties, and when he finally succeeded in forcing enough cocain into the canal to produce anesthesia sufficient to remove the pulp, he discovered a pulp-stone acting as a piston and filling the root-canal so that the cocain could not penetrate to the sensitive portion of the pulp.

In abscess at the apex of a tooth, considering the presence of bacteria, the physical condition of the patient must be an important factor. I have frequently sterilized and filled such roots as perfectly as possible and crowned the teeth or inserted in them inlays or fillings, and for a number of years the operation was perfectly satisfactory as long as the patient was in good health, but if the patient's health failed and his vitality was lowered, the bacteria became active, and recurrence of the abscess occurred.

I should like to ask the essayist, regarding his quotation from Dr. Miller, whether he meant that a diseased pulp can revive and throw out healthy secondary dentin, or whether portions of a pulp may become isolated while the pulp is in a healthy condition, and throw out secondary dentin.

Dr. BUNTING (closing the discussion). I appreciate very heartily the remarks of those who have so liberally discussed my paper, and wish to thank them for their interest in this subject and their valuable suggestions. I am especially grateful to Dr. Ward for his *résumé* of

the opinions held today regarding the advisability of crowning vital teeth.

It should be understood that this subject has been taken up from a scientific viewpoint, and I want to thank the discussers for emphasizing its clinical significance.

The next order of business was the reading of a paper by Dr. C. M. McCauley, Abilene, Texas, entitled "Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties," as follows:

Amalgams: Their Manufacture, Manipulation, and Physical Properties. Cements: Their Manipulation and Physical Properties.

By C. M. McCAULEY, B.S., D.D.S., Abilene, Texas.

Since the introduction of amalgam as a tooth-filling material, it appears that the dental profession has regarded this subject as being more or less cloaked in mystery. This must be due to the fact that so little was known about amalgam for so many years that men assumed an attitude of carelessness and indifference toward it.

An excellent means to discourage men in any line of endeavor is to convince them at the beginning that "There is no use." Young men who have entered our profession have been told in college that the amalgam question involved many perplexing problems; this has been taught and drilled into them since the beginning of dental teaching to the present date. It is true that there are some questions regarding metals of which we actually know little, and the more we study, it seems, the farther we depart from definite truths. These questions do not concern us as dentists, however, as much as do practical and well-established facts. The things which we should understand are the physical properties of amalgams and their ability or inability to conserve tooth structure. These phases of the amalgam problem have been made perfectly clear, and there is no longer any mystery connected with them. The work preparatory to writing this paper has been undertaken with the hope that some of these questions might be made plainer to some practitioners, that their minds should be put at ease, and their work with amalgams improved. Some important factors associated with selecting an alloy and manipulating an amalgam seem to be overlooked as such by a great many men. In some instances the observance of these factors means economy of time and cost, as well as assurance of improved service to the people.

The history of the amalgam question has been dotted here and there by investigations directed toward improvement. At first the aim of these efforts was better working qualities. This was realized when tin foil was added to coin-silver filings, which were formerly used with mercury. The working qualities were improved by adding tin foil in certain proportions, and then melting this mixture into an alloy; otherwise it was

not known what effect the tin foil produced. The questions now to be solved were the cause and correction of such physical properties as were found detrimental to amalgams as tooth-preserving materials. This phase of the question has always received much thought from a great many investigators. All these investigations may be placed in three general classes: namely, (1) The test of time. (2) The chemical theory of alloying metals. (3) Balancing opposing physical properties of metals composing alloys, and taking measurements of all movements found in amalgams while setting.

THE TEST OF TIME.

In the study and experiments here reported I have not overlooked any of these three classes. The first one was only a stepping-stone to higher advancement. Its claims to recognition by scientific men vanished when the germ theory of disease was accepted. It is an undisputed fact that conditions in different mouths are very unlike, and that a filling might stand the test of time in one mouth, and fail in another. The best assurance we may have in our amalgam work against recurrence of caries is the certainty that our fillings will not shrink sufficiently to allow micro-organisms to enter between the filling and the cavity wall, and will not permit sufficient flow to disturb the marginal adaptation. I have made several test fillings of different alloys the claims for the superiority of which are based on the test of time in the mouth, and without exception they have showed sufficient shrinkage to admit caries-producing germs at the margins of these fillings. In addition to this shortcoming, they have proved lacking in strength, and in many cases the flow was extreme. In the arrangement of the formulæ for these alloys, smooth-working qualities and apparently easy manipulation have been the most prominent factors. What is generally regarded as easy manipulation is necessarily antagonistic to the best results, because the factors which render such easy manipulation of an amalgam possible make the stability of the filling in the cavity impossible. It is unfortunate for our profession and for those whom we serve that so large a percentage of the dental alloys that are being offered on the market at the present time are made by manufacturers who base their knowledge on the test of time, and are used by practitioners because of their supposedly easy manipulation. Such practice on the part of the manufacturers is far from scientific, and there is no excuse for professional men using such materials, in view of the knowledge which is within our reach. One of the dearest and most widely advertised alloys was tested, and I found, during the first twenty-four hours, 6/10,000 of an inch, or six points, of shrinkage; twenty points, or 20/1000 of an inch of flow, which is nearly one-fourth its volume, and an average strength of only 236 pounds. Such shrinkage is absolutely fatal. The flow is ten times more than it should be, and the strength only two-thirds as much.

THE CHEMICAL THEORY OF ALLOYING METALS.

The chemical theory is based on the belief that the best dental alloys can be obtained only when the metals are combined chemically in the ratio of their chemical equivalence. The claim has been made that this procedure will furnish a combination which will best resist the action of the oral fluids on the surface of

the filling, but this seems an unimportant item as compared with the movements and changes of a filling within the cavity

immovable and strong when made into an amalgam; yet these metals, used according to the idea of one who advocates

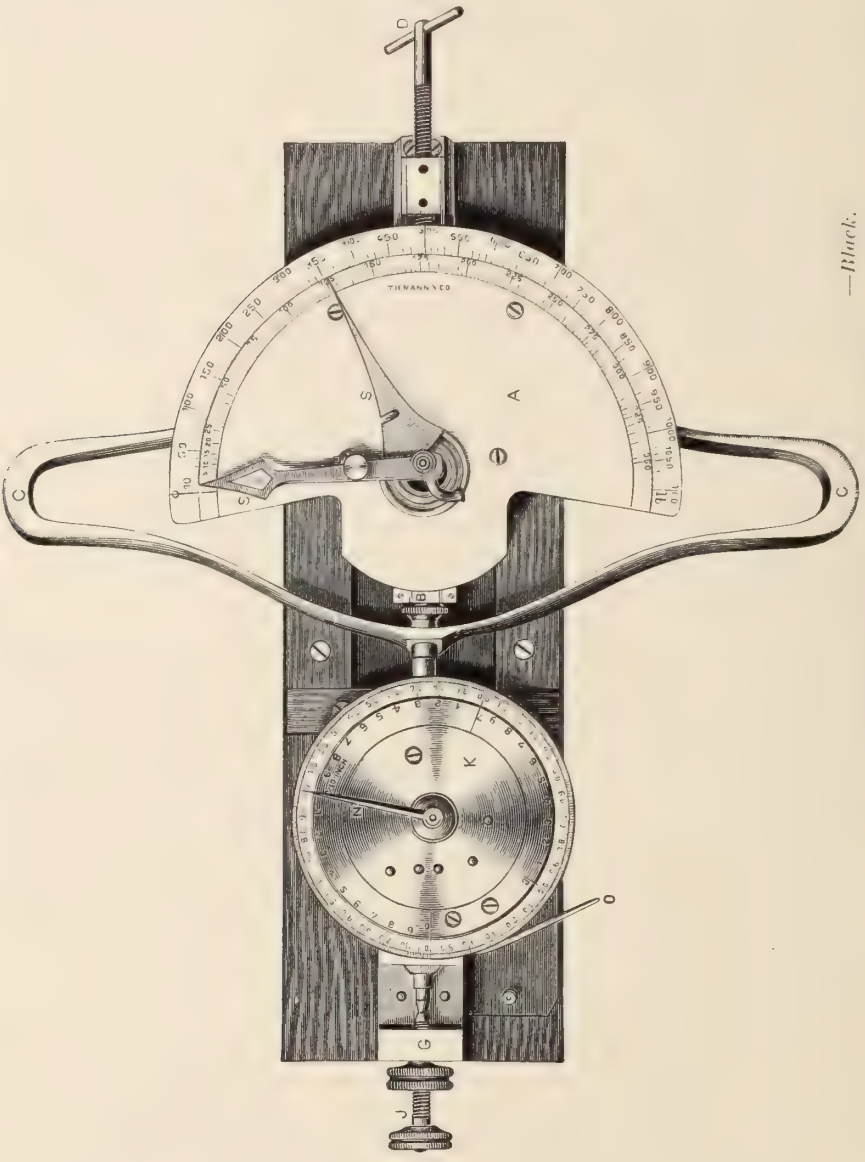


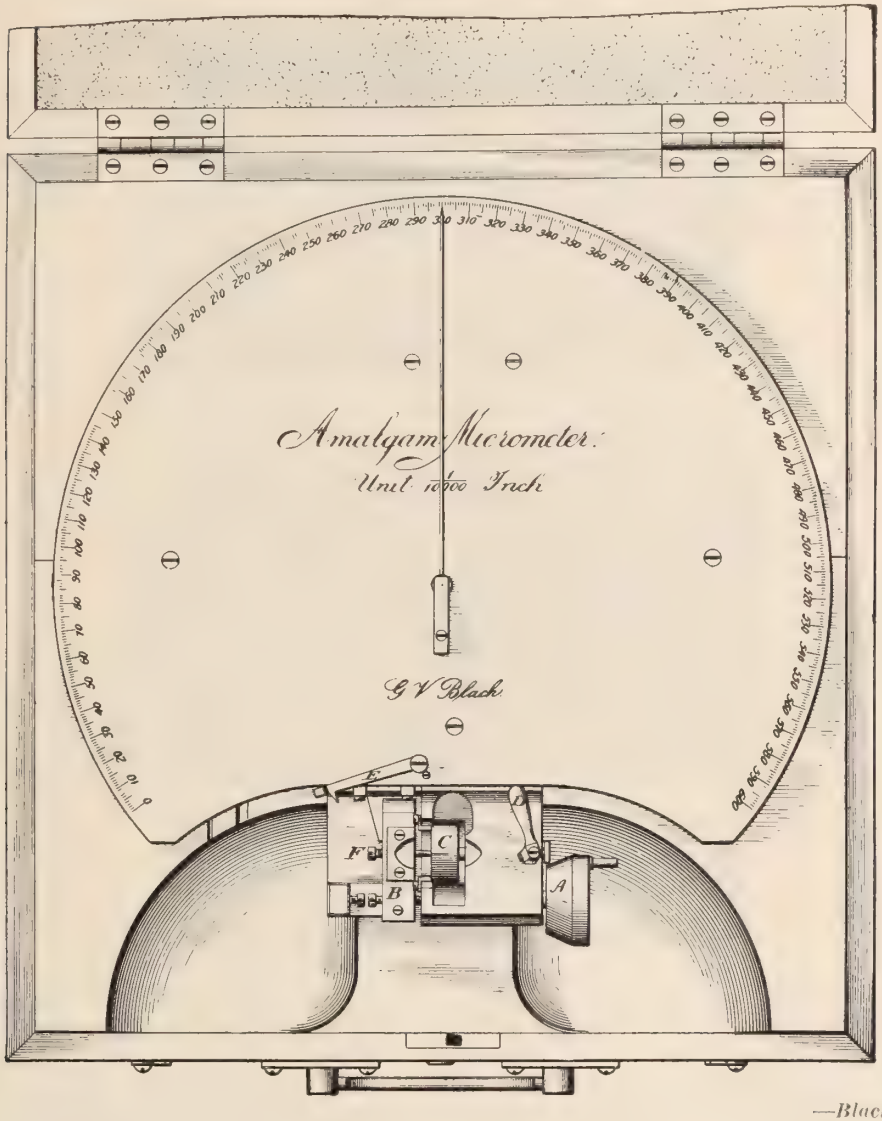
FIG. 1. Dynamometer with micrometer attachment.—*Black.*

itself. The dissolving of metals in each other in such proportions that movements in one will exactly counteract movements in the other will produce a mass which is

the chemical theory, will produce a filling which is unstable, both as to shrinkage and flow, and is also lacking in strength. One investigator who has done a great

deal of work in this field for many years has concluded that silver and tin, in the ratio of 48 : 52, makes the most dependable alloy for filling purposes. I made an alloy from these metals in these proportions, using care in every detail, but measurements revealed a most unsteady condition of the filling, as well as excessive flow and little strength. If this scientist is correct in his conclusion that tin and silver unite chemically in the ratio named above, then it is unwise to accept the chemical theory until much more shall have been learned concerning it.

FIG. 2.



—*Black.*

Micrometer for the measurement of shrinkage or expansion of amalgam.

We shall therefore set aside the chemical theory, as it is not only obscure and confusing to men who are not chemists, but it fails to stand the test.

up the physical properties of amalgams one by one, ascertained definitely what produced every physical phenomenon contributing to good or evil results in

FIG. 3.

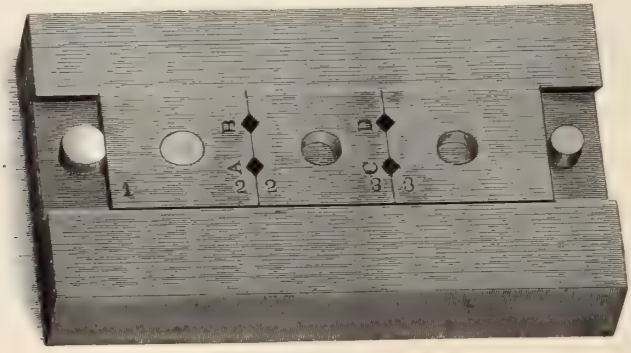
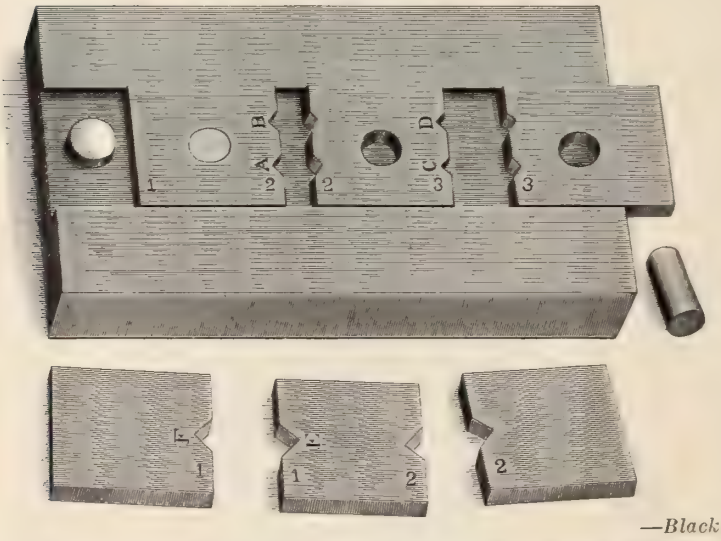


FIG. 4.



—*Black.*

FIGS. 3 AND 4: A steel matrix for making experimental fillings of gold or amalgam. Hardened steel slides are secured in a steel holder and made firm by inserting the steel pin shown at the right in Fig. 4, the pin on the left being immovable. The fillings are made in the holes marked A, B, C, D. These are 8/100 inch cubes. By removing the pin on the left the slides may be separated (as shown in Fig. 4) or removed, and the fillings taken out for examination. The set of slides below in Fig. 4 are for 1/10 inch cubes. Slides for several sizes of fillings may be used in one holder.

BALANCING OPPOSING PHYSICAL PROPERTIES OF METALS COMPOSING ALLOYS.

The third class of tests mentioned was introduced by Dr. G. V. Black. He took

alloys, and pointed out ways and means of correcting the vital faults appearing as he proceeded with his work. His plan was to devise instruments for measuring

the movements of amalgams in setting, and to ascertain the strength of the final products. These instruments were scientifically built, and unquestionably work most accurately of any yet made for this purpose. His micrometer (see Fig. 1) is so constructed that the slightest change in volume, expansion or contraction, can be measured, even to the 1/20,000 of an inch. With this instrument minute measurements can be taken with the same degree of accuracy that the mechanic can measure the half-inch or the half-foot. Black's work throughout was of the most accurate and painstaking character, and up to this date no one has succeeded in disproving any of his conclusions. The results of the following experiments, which were made in Dr. Black's laboratory, conform in every point with his conclusions, and only tend to emphasize their accuracy. (See Figs. 2–5.)

FIG. 5.

A B

—*Black.*

A, Steel tube with an amalgam test filling. B. Steel tube used for trial fillings.

Dr. Black also made a matrix with which fillings could be made of uniform size in the form of a cube. He also built the amalgam dynamometer with which he tested these small fillings (which were 85/1000 of an inch in size) for strength in pounds. To the dynamometer a small micrometer is attached, with a scale made of units of one-thousandth of an inch. This instrument registers the flow under a given pressure within a given time. The binocular microscope was used to verify the work of the micrometer. In all cases where the micrometer indicates shrinkage or expansion in any marked degree, this microscope enables one to actually see the change which has taken place.

EXPERIMENTS.

Weighing of metals. The metals used in each melting were carefully proportioned and weighed to the accuracy of 1/64 of a grain. The amount made up each time varied from 10 to 30 grams, depending upon the different tests desired.

Alloying. The following is Dr. Black's latest statement regarding the alloying process:

> An alloy is a solution of one metal in another metal, or of several metals in each other. This solution is similar in its nature to the solution of common salt in water. To properly form an alloy, this solution must be complete. That is, every individual cubic centimeter of the salt water, or of the alloy formed, represents the same percentage of its ingredients as the whole of the body of which it is a part.

The alloying of metals must be done in the molten state. Time and agitation enter into the question of complete solution. Yet a high-fusing metal may often be dissolved in a lower-fusing metal without raising the temperature more than a few degrees higher than the melting-point of the alloy formed. This is done best in the closed crucible in an atmosphere of hydrogen, to prevent oxidation.

The metals enter into solution one with another, or several together, in all proportions, only some differences in readiness of solution being noted. In this solution there seems to be no question of chemical union of the metals.

The formation of eutecticons in alloys of metals, when overheated, is a frequent occurrence. In this two or more alloys are formed in the mass, differing in the percentage of the metals contained, and in the fusing-points. To the ordinary observer this may be seen by re-melting the alloy under favorable conditions for observation, and closely observing its behavior. If there are no eutecticons, all of the mass will melt at one degree of heat. If there are eutecticons, the lower-fusing alloy will become fluid at a certain degree of heat. The particles of the higher-fusing alloy will be afloat in this, but not melted. This may be so abundant as to give the metal a doughy consistence at this stage; then a higher degree of heat is necessary to melt this higher-fusing alloy and render the melt complete. The condition of the metal when between the two melting-points will vary as the lower and higher melting portions differ in abundance. Dentists in using die and counter-die metals observe this condition often in the alloys that have been melted many times.

A precisely similar thing occurs in solutions of salt in water, when cooled several degrees below the ordinary freezing-point of water. A portion of water will freeze. This frozen portion is found to have only a certain comparatively low percentage of salt, while the remaining mother liquor is richer in salt.

There is no other use of alloys in which attention to all of these details in forming them is so important as for amalgam-making. Any change in the alloy from the perfect result changes its relation to mercury; and especially any failure in obtaining a perfect solution of each metal in the other, or leaving some portion as a mixture instead of a solution, so changes its relation to mercury as to destroy that perfect balance of metals on which the accuracy of results depends.

Unless the factor of perfect alloying is carefully observed, the ingot will not be of uniform proportions throughout, and the filings cut therefrom would not be of uniform proportions and physical properties. Care must also be used to prevent waste by oxidation during the heating process, because the slightest difference in degree of oxidation in the metals would change the proportions which have been so carefully weighed before beginning, and in dental alloy-making the proper proportioning of metals means very much indeed. Oxidation was prevented in these tests by using a closed electric crucible with a gas-pipe fitted in the top, through which hydrogen was permitted to flow during the melting process. The gas drives out the oxygen and flows over the surface of the metals during heating. The heating device consisted of two rheostats so connected that the current could be controlled so as to pass by sixteen steps from the melting-point of tin to the melting-point of gold, thus permitting of more gradual heating. This apparatus, after a little practice, will enable one to judge very closely the proper degree of heat to be used each time for procuring a perfect alloy, yet not so high as to disturb the balance in the metals by the divisions known as eutecticons.

Filing and annealing. After pouring and cooling the ingot, the filing is done slowly to prevent heating by friction. The alloy is next sifted through a fine sieve to remove the larger fragments, and a magnet is passed through the filings

to remove small particles of steel. One-half the filings are then placed in a bottle and labeled "Fresh-cut," and test fillings are immediately made therewith. The rest of the filings are annealed.

Aging of alloys. It has long been known that alloys undergo a change with age. Different reasons have been advanced for this change. Some still believe that it is caused by oxidation of the filings of alloy from exposure to the atmosphere. This is an error. Dr. Black has proved beyond any question that this change is produced entirely by heat. The degree of the aging is dependent upon the degree of heat and the length of time. Exposure to the air produces no change unless heat is present. In the same way agitation in the bottle produces no change, unless heat is present. Inasmuch as heat proved to be the only factor in this change, Dr. Black termed it simply tempering or annealing of metals. All commercial alloys must be annealed before being placed on the market, in order to render their physical properties as permanent as possible. A fresh-cut alloy, which will make a good amalgam immediately after cutting, will show marked shrinkage after a few months. If the alloy is fully annealed, the maximum shrinkage will occur at once, and no further movement will appear. If the alloy is partly annealed, only part of the shrinkage is overcome, and age will continue to change the alloy until it is fully annealed. Many tests for determining the degree and time of heat for proper annealing have been made, and it has been determined that shrinkage decreases as the filings are heated in boiling water, up to fifteen minutes. Longer boiling does not produce more shrinkage, but it will cause slower setting and less strength in the amalgam. The stage of annealing at which no further shrinkage appears Dr. Black has termed the "zero point" of annealing. A balanced formula annealed to this point is rather quick-setting; if the alloy is annealed beyond this point, setting is effected more slowly; therefore any first-class alloy must be quick-setting.

After alloys are correctly annealed, time or age continues the process of weakening or softening. The best alloys to be had will finally grow so old standing on the shelf or in the cabinet that their utility will be destroyed. Alloys should never be used after one year from the time of cutting and annealing. Our only means of protection in this respect is to refuse to accept a package of alloy unless the date of manufacture is plainly stamped thereon. Slow setting is an evidence of over-aging; also the percentage of mercury required diminishes as the age of the alloy advances.

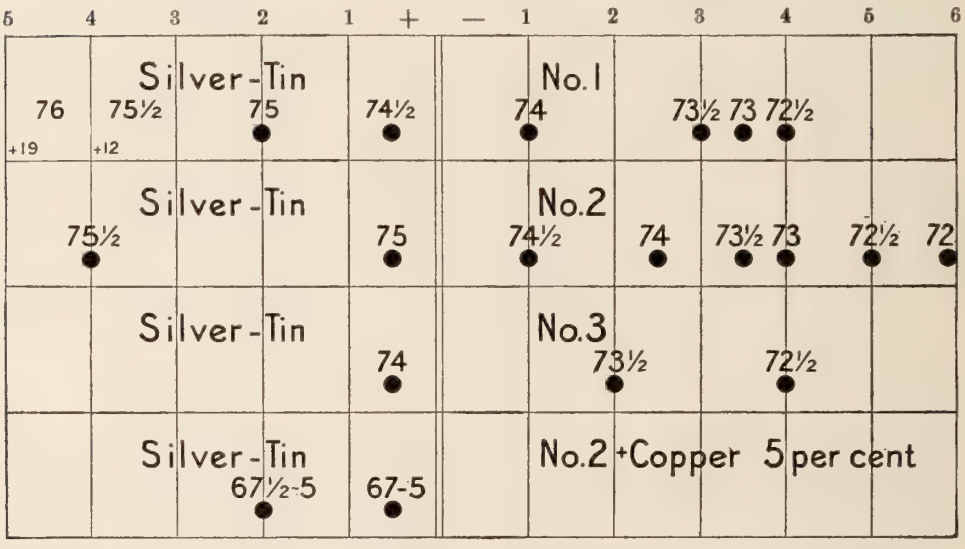
TESTS.

The series of silver-tin tests selected for this work was begun with 40 per cent. silver and 60 per cent. tin, and the silver scale was advanced 5 per cent. at each melting. Thus the amount of silver increased 5 per cent. each time, while the tin decreased 5 per cent. This series was to determine the proportion of these two metals which would produce the greatest number of desirable and the smallest number of faulty physical properties.

Expansion and shrinkage. Liquid metals possess the property of changing their volume when passing into the solid state. Some expand and others shrink. In the case of silver and tin, the one expands and the other contracts. The object of this test was to locate the precise place on the scale where the expansion of silver will overcome the shrinkage

of tin and produce an immovable mass. It has been stated that aging or annealing causes shrinkage, hence it became necessary to make tests both of fresh-cut and annealed alloy from each melting. A filling of each was made in the Wedelstaedt tube after the formula of 40 per cent. silver and 60 per cent. tin, measured in the micrometer and recorded. if used fresh cut. Fresh-cut alloy being impracticable, on account of age producing shrinkage, unless used the same day it is cut, further search was made for the point of no shrinkage or expansion in the annealed alloy, or the point of balance, as we shall hereafter term it. Going up the scale 5 per cent. each time, leaving out the report of the record of the fresh-cut

Diagram showing Expansion and Shrinkage, in Points.



These tubes were measured again every few hours at first, and once a day after two days. Both fillings showed shrinkage, which indicated a need of more silver. Fillings were next made from an alloy of the formula 45 silver, 55 tin. Shrinkage was still present, but was seen to be a trifle less than before. This advance on the silver scale of 5 per cent. at each melting was maintained until the formula 65 : 35 was tested. At this point shrinkage in the fresh-cut disappeared, but the filling made of the annealed alloy shrank eight points. Around this point on the scale a good alloy could be made alloy, at 75 : 25 shrinkage had ceased and expansion appeared. Going back to the formula 70 : 30, shrinkage of 5½/10,000 of an inch was noted. It now seemed evident that the balance point lay somewhere between 70 per cent. and 75 per cent. of silver. A filling of alloy of the formula 72½ : 27½ was made, and slight shrinkage was still noted. I now determined to go up the scale one-half of 1 per cent. each time, carefully testing all the way, until the balance was reached. The shrinkage gradually disappeared, growing a little less each time one-half of 1 per cent. of silver was added. At 74 per cent. silver,

1/10,000 of an inch, or one point, of shrinkage appeared. At 74½ per cent. of silver, no shrinkage occurred, but instead a half-point, or 1/20,000 of an inch, of expansion occurred. The precise balance lies between these two points, 74 and 74½, but as a half-point of expansion is rather to be desired, this formula of 74½ : 25½, when found to remain unchanged in the cavity for ten days, was recorded.

Dr. Black has said that no set formula can be relied upon because of the different degrees of fineness existing in the commercial metals. To determine the accuracy of this conclusion, I procured some more metals from a different source, and made a number of fillings, ranging in proportions of silver both above and below the formula already found, these fillings differing from one another in the amount of silver by one-half of 1 per cent. In the case of metals No. 2, the formula established for metals No. 1 showed shrinkage of one point, and the balance was located at 75 per cent. silver, 25 per cent. tin. In a third lot of metals I found the balance point at 74 per cent. silver. The figures in the accompanying table most clearly show this gradual approach to and from the balance point.

The above diagram seems to illustrate plainly three facts: First, that the balance point in alloys can be precisely located; second, that a variation of one-half of 1 per cent. from this point may produce very detrimental properties; third, that a scientific alloy made from a set formula is an impossibility when commercial metals are used.

The lines on the right and left of the double line represent points. The dots are so located as to show the number of points of expansion or shrinkage. The figures near the dots represent the percentage of silver, the remaining percentage in each case being tin.

This point of balance has been found as low as 72½ silver by Dr. Black. It may readily be seen that any set formula adopted between 72½ silver and 75 per cent. silver might be good or might be very bad. Hence, as Dr. Black has formerly concluded, the only scientific method of arriving at correct proportions consists in working out the balance in the manner indicated above, and securing a separate formula for each lot of metals procured from the market. Even a silver shortage of one-half of 1 per cent. will allow shrinkage sufficient to destroy the utility of a filling, regardless of the degree of skill used in placing the filling in the tooth.

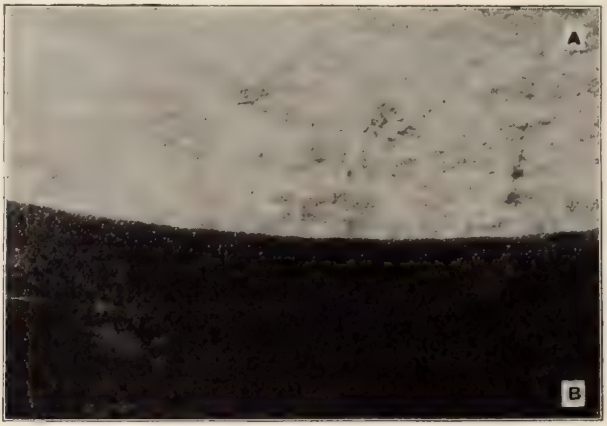
To be inaccurate the 1/10,000 of an inch in the movement of a filling may ruin the filling. If the balance point is missed by one-half of 1 per cent. in the proportion of the metals, this degree of inaccuracy will be produced. Hence, in order to obtain a perfect filling, the alloy must be scientifically balanced. There is no other known way of finding the balance point in alloys of metals except that discovered by Dr. Black, which requires very close measuring, together with the most accurate technique in making the alloys. Therefore we may conclude that the alloy-maker, however skilful he may be, cannot make a scientific alloy without the aid of such instruments as will detect the slightest movement in an amalgam while setting.

The maker who still uses the test of time as his guide is groping in the dark. His work is all done by guess, and is bearing such fruit as is seen in the failing of all amalgam fillings for which his alloys are used. There are less than a dozen amalgam makers in the business

at this time who are known to possess the instruments necessary for making scientific alloys. The practice of following a set formula in manufacturing an alloy is pernicious, and should not be tolerated by the dental profession.

The effect of the shrinkage of amalgam fillings is discoloration and recurrence of caries. (See Figs. 6 and 7.)

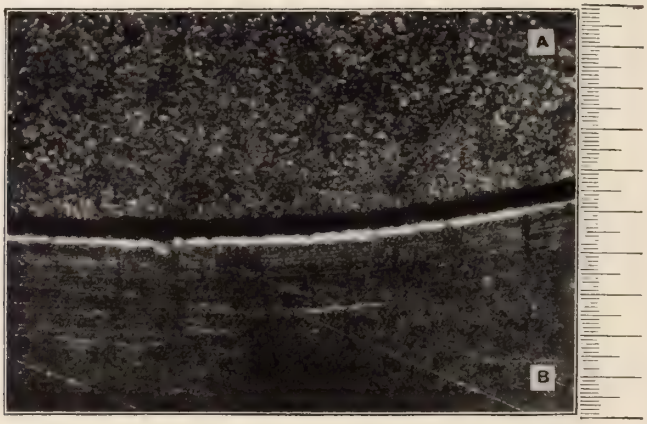
FIG. 6.



—*Black.*

Showing segment of the margin of an amalgam filling in steel tube. (Enlarged 54 diam.) A, Amalgam. B, Steel tube. (This amalgam shows no movement.)

FIG. 7.



—*Black.*

Showing filling in steel tube. (Enlarged 54 diam.) A, Amalgam. B, Steel tube. The scale is also attached. Such shrinkage is common with annealed amalgam composed of silver and tin, varying from 50 to 65 per cent. of silver. Adding gold, platinum, or copper gives but little change in the results.

Shrinkage of one point as shown by the micrometer measurement may produce a ditch between the filling and the

cavity wall as wide as one ten-thousandth of an inch. The micro-organism which produces caries measures from four-tenths to eighth-tenths of a micron, the micron being 1/1000 of a millimeter or 1/25,000 of an inch. Therefore the micro-organism measures from 1/65,000 to 1/32,500 of an inch, and a few figures will reveal the fact that one point of shrinkage will open up a passage sufficiently large to admit from three to six of these offenders side by side.

Even less than one point of shrinkage will admit micro-organisms, and caries may begin again where the cavity margins cross a susceptible area. The question therefore arises as to what should be done with the vast number of commercial amalgams which shrink from 1 to 15 and even 20 points.

Discoloration is caused by the ingress around the filling of moisture laden with hydrogen sulfid, which is found in all mouths. Sulfid of silver in the case of silver-tin alloys, and sulfid of copper in amalgams containing a large percentage of copper, are the results. These compounds are very dark in color. It will be noted that a space must be present for the entrance of this moisture. This space is created by faulty manipulation or shrinkage in the amalgam. Moisture may enter a space which is too small to admit micro-organisms, hence discoloration may occur without caries; but in either case the space exists first. The measurements given here are inconceivably small when compared with a unit so coarse as the inch or even the millimeter. It must be borne in mind that we are dealing with a microscopic object when speaking of micro-organisms, and that small units must be used in measuring their dimensions, and highly magnifying lenses in studying them. The same unit should be used in measuring the opening through which the micro-organism is destined to enter, set up his deadly work again, and bring to naught the good which we thought our skill had wrought. No degree of skill on the part of the operator can possibly overcome the shrinkage of an amalgam.

Strength and flow. Cubes for testing strength and flow were made from each alloy of the above series in which search was made for the balance point. These cubes were 85/1000 of an inch in size. In the test for expansion and shrinkage an unsteadiness was noted to exist in the filling. Shrinkage would continue for a time, then expansion would set up and continue for awhile. Possibly one day expansion would show and the next day shrinkage. This unsteadiness gradually disappeared as the point of balance was approached, and appeared again after this point was passed, either up or down the scale. The maximum strength and the least flow seemed to be just around the point of most perfect steadiness. Cubes of 85/1000 of an inch in size made from alloy of a balanced formula withstood as much as 450 pounds of pressure, while alloy made after the chemically balanced formula broke at less than 200 pounds.

By *flow* is meant the gradual moving out of an amalgam from under pressure, either constant or intermittent. A block of tin of 85/1000 of an inch in size, when subjected to 100 pounds of pressure, will soon be reduced to a thin sheet. Silver will not flow; a certain pressure will flatten a silver block to a certain degree, but after that no further movement will occur, unless the pressure is increased. The flow of amalgam, next to shrinkage, is perhaps its most fatal defect. Some commercial amalgams

showed as much as 20 per cent. of flow under 50 pounds of pressure applied for a period of one hour. Amalgams made from scientifically balanced alloys will show only from 1 to 3 per cent. of flow under the same pressure applied for the same time.

MODIFICATION WITH OTHER METALS.

Many modifying metals have been tried in connection with the silver-tin alloys. Copper so far has been found to be the only metal that improves the amalgams. Any other metal used as a modifying metal has so far proved to be actually detrimental. Some of the metals will not readily enter into the alloy solution, and consequently are very difficult to distribute evenly in the melting. It is thus readily seen how different parts of the ingot will make fillings containing different proportions of the metals. When these proportions are at variance, the physical properties shown in the fillings are different, and the fillings seem to acquire again that unsteadiness which occurs above and below the balance point. Zinc is very unfavorable in its action upon other metals in a dental alloy. I made two fillings containing only 1 per cent. of zinc. They behaved very well under the ten days' test at first, but measurements made three months later showed nearly 100 points of expansion. Too much mercury will also decrease the strength and increase the flow of an amalgam. The substitution of 5 per cent. of copper for an equal amount of silver increases the strength of amalgams made from silver-tin alloys.

MANIPULATION.

Manipulation has proved to be an important factor in the production of good amalgam fillings. It seems to have no effect on shrinkage and expansion, but strength and flow are largely controlled by the manner of manipulation. Adaptation to the cavity walls and margins, and finish, are entirely dependent upon the operator. These qualities of an amalgam filling are best accomplished—First: By using the proper amount of mercury. Second: By proper amalgamation. Third: By proper packing within the cavity. Fourth: By proper adaptation to the margins. Fifth: By proper finishing.

The mercury and alloy should be weighed and put up in separate capsules of convenient sizes. This will be found economical practice because of the saving in both ingredients. Better strength and less flow result when the proper amount of mercury is used. A deviation in either direction of more than 5 per cent. from this proper amount produces perceptible weakening and increased flow. The assistant or the operator himself can weigh out these capsules at odd times. The correct percentage of mercury varies from 35 to 65 per cent. or more, depending upon the alloy used. Alloys of a high percentage of tin require less mercury. A balanced alloy made of silver and tin with 5 per cent. copper, when freshly made, will require about 55 per cent. of mercury.

Amalgamation should be started in the mortar or finger stall. When the mercury has taken hold of the alloy, the mixture should be removed to the palm of the hand and kneaded briskly. At first the mass will seem to be lacking in mercury. The kneading is continued for a few moments, when the mercury will begin to appear on the surface. Soon there may appear to be an excess of mercury. The kneading is continued from this point until crystallization begins, which is in-

dicated by a crackling sound; at this stage there should be no shortage or excess of mercury; if, however, the amalgam should seem a little too wet, the excess mercury is squeezed out in the usual way.

The packing of the amalgam into the cavity is more perfectly accomplished at this point of its plasticity than at any other. The operator should use as large pieces as will readily enter the orifice of the cavity, and apply all the pressure at his command, using the pen grasp. A large serrated point should be used. A matrix is absolutely necessary in all approximal cavities. Perfect adaptation to the cavity margins is more difficult to obtain with amalgams than some operators appreciate. Proper plasticity, acquired by the right amount of mercury, is our greatest aid in obtaining good margins. If the amalgam contains too much mercury, it will draw away from the margins; if not enough it is very difficult to press it well against the margins, especially the approximal and gingival ones, overlapped by the matrix. This consideration alone will repay one for the time and trouble of weighing the ingredients for all amalgam fillings.

Dr. Black's solution of the amalgam problem has rendered a vast service to our profession; to him belongs the credit of indicating a scientifically balanced alloy. The full measure of good done by his labors will not be thoroughly realized by the profession, however, till dentists become familiar with the working properties of properly constituted and balanced alloys, and discard such alloys as are soft and velvety to the touch, and seemingly easy to work. The dentist who selects such an alloy for amalgam fillings is laying the foundation for future troubles, which are sure to come. I have known cases where a practitioner rejected an excellent alloy and chose in its stead one which was quite inferior, yet could be manipulated in a manner to suit his fancy. Such practice is unscientific and below the dignity of one who is affiliated with a scientific calling.

Cement.

In the work which I have conducted at different periods for the past two years on the physical properties of dental cements, nothing has been learned which has not been heretofore published. I have made, however, many comparative tests of the properties of a few of the leading cements on the market, which I submit here with the hope that some good may be derived from these observations. I mean by "leading cements" those of which dental supply houses report the largest sales. These tests were first made for the Texas State Dental Association, and were confined to the cements enjoying the widest sale in that state.

When one attempts the study of dental cements many obstacles rise in his way, chief among which is the fact that the medium in which the cement is placed after mixing has so much to do with its properties and actions, and that the media in which our tests are made are so different from the conditions present in the mouth.

The tests made for expansion, shrinkage, and porosity are perhaps less subject to criticism than those made for strength and adhesion. I have reason to believe that cements are stronger in the mouth than in dry surroundings. When cement is examined under the microscope, crystallization is seen to continue for many days. If by this crystallization, which goes on in the presence of a proper amount of moisture, the strength of a

cement is increased, the above supposition is true. In a dry medium, however, the greatest strength is shown after from twenty-four to forty-eight hours.

Unfortunately, we cannot manipulate cements with the same degree of certainty as to results as we can amalgams. For amalgams a scientific procedure has been established, where training in the senses of touch and sight is of secondary importance, while with cements these items are of first consideration. We cannot weigh our ingredients and proceed by a definite plan when mixing cements. We must determine the proportions as well as the technique of procedure by guess. The more we observe all these factors and compare results, the better shall we be able to guess what is best. This indicates how far from a scientific basis we still are in our manipulation of dental cements.

MANIPULATION.

In mixing cements different methods of procedure have been observed, and the results noted. Rapid mixing does not seem to produce the chemical action which is necessary between the powder and the liquid to impart the highest degree of strength. Gradual incorporation of the liquid and powder produces more strength than rapid mixing. Time sufficient for the formation of the necessary zinc phosphate must be allowed during the mixing process.

The best results have been obtained when the powder was carried into the liquid in several separate portions, and each portion spatulated until perfect smoothness was produced.

Stiff mixtures for filling purposes show approximately 20 per cent. more strength than those thin enough for setting crowns or inlays.

TESTS FOR EXPANSION, SHRINKAGE, AND POROSITY.

The tests for expansion, shrinkage, and porosity were made by placing the fillings in the ends of small glass tubes and subjecting the fillings to moisture. This was accomplished by placing the filled end of the tube in a bottle containing water. The tube was held in position by passing it through a perforated cork. Eosin solution was then placed in the glass tube above the filling and the tube sealed. Protrusion of the filling from

	CEMENT.	Expansion.	Shrinkage.	Porosity.	Degree of Eosin Penetration.
	Feb. 1910.				
1	Harvard	A	C	B	D
2	Harvard	A	B	B	D
3	Petroid N. P.	A	B	B	D
4	Fellowship N. P.	A	B	C	D
5	Fellowship N. P.	A	B	A	B
6	Fellowship	A	C	A	D
7	Fellowship	A	B	C	C
8	Ames' Cr. and Br.	A	B	A	A
9	Ames' Cr. and Br.	A	B	A	A
10	Ames' Cr. and Br.	A	A	A	A
11	Ames' Cr. and Br.	A	A	A	A
	1911.				
12	Harvard	A	B	B	D
13	Harvard	A	B	B	D
14	Weston's	A	C	B	D
15	Weston's	A	C	B	D
16	Caulk's Petroid	A	C	B	D
17	Caulk's Petroid	A	B	B	D
18	Fellowship N. P.	A	A	B	A
19	Fellowship N. P.	A	B	B	B
20	Ames' Brown	A	B	A	A
21	Ames' Brown	A	B	A	A
22	Ames' Cr. and Br.	A	A	B	A
23	Ames' Cr. and Br.	A	A	B	A

A, Not sufficient to be seen with the unaided eye. B, Sufficient to be seen with the unaided eye. C, Quite marked. D, Eosin solution penetrated entirely through, and into the water below.

the end of the tube would indicate expansion, while shrinkage would be shown by the eosin solution passing down between the filling and the tube into the water below. When the eosin solution penetrated into the substance of the filling, porosity was present.

On the opposite page is a tabulated comparison of the above three properties, as indicated by the tests made.

TESTS FOR CRUSHING STRENGTH AND ADHESION.

For the tests for crushing strength, fillings were made in the form of cubes of 1/10 of an inch. These were crushed in the dynamometer, and their strength in pounds was recorded. The average was taken from the four strongest fillings in each case.

Adhesion was tested by cementing a rounghened metal surface of about 36 millimeters square to fresh bone, which was also roughened. These tests had to be made dry because, when the test pieces were placed in water, the metal soon dropped off. In a dry medium the adhesion decreased after from the first to the second day. The averages noted when the metal was pulled away from the bone are given in pounds in the table below:

	Crushing strength. lb.	Adhesion. lb.
Ames' D. Liquid	...	7½
Harvard	64	5½
Fellowship N. P.	65¾	5¼
Ames' C. Liquid	82	5
Petroid Improved	53¾	3¾
Ames' Oxyphos. Cop.	213	..
Caulk's Oxyphos. Cop.	81	..

Discussion.

Dr. F. B. Noyes, Chicago, Ill. We are to be congratulated on having had presented to us a paper which represents such a remarkable amount of work. The value of such a paper lies in bringing again to the attention of the profession the scientific facts which are at the basis of such a useful material as amalgam. It has always seemed strange to me that the work done in this field fully eighteen years ago by Dr. Black has produced so little effect on the dental profession, and so little change in the amalgams which are being used today. The profession is using, almost by the ton, alloys which so shrink, according to laboratory experiments, that we cannot make a perfect filling. Why do we pretend to be a scientific profession and laud our scientific attainments to the skies, and yet disregard the scientific basis of one of the most important materials we use? I hope that the renewed presentation of this subject by Dr. McCauley will bring it to the attention of the younger practitioners at least, so that they may use this material scientifically in their own practices. If the paper will accomplish that result, it will do a vast amount of good. We are all indebted to Dr. McCauley for repeating the work that was done before and for bringing this question again to the attention of the profession, and demonstrating the correctness of the interpretations of previous observers.

Dr. D. M. Gallie, Chicago, Ill. In discussing this excellent paper I shall simply say a word on the necessity of proper manipulation, and on purchasing the best alloy that the market will provide. When we stop to consider that men like Dr. Black, Dr. Wedelstaedt, Dr. McCauley, and others, have worked so assiduously to perfect the manufacture of alloys, and acknowledge that they still have failures, what can we expect of the alloys that are being peddled from office

to office at one dollar or seventy-five cents an ounce. If scientifically prepared amalgams fail, what can we expect of the average alloy that many practitioners are using? Still, no matter how skilfully alloys are manufactured and how pure the metals may be that go into their manufacture, the manipulation of this material, the proper preparation of the cavity and the finishing of the filling are, in my opinion, of the greatest importance. A few months ago Dr. Southwell held a clinic at Chicago demonstrating the results of the following interesting test: Matrices were sent to different operators with the request that one cavity be filled with gold and one or two with amalgam. Salt-water pearl matrices were employed to demonstrate the adaptation of the gold and its specific gravity. These pearl matrices were also used for the amalgams, but since they proved a failure, several steel tubes were sent out with the request that these operators fill them with the same kind of amalgam as they used in their offices. These fillings were tested. Some practitioners who are supposed to be representative operators and who showed a perfect score in gold fillings, indicating their great manipulative skill, presented amalgam fillings which developed leakage when subjected to only three pounds of pressure. Judging from their gold fillings, these men certainly could manipulate amalgam, and the very fact that the most skilful gold operators fell short in the working of amalgam showed that there must be some intrinsic fickleness in the material itself. This fickleness and uncertainty has brought me to the conclusion that we cannot be too careful in purchasing alloy, and must exercise all possible skill in its manipulation. We must also see that the cavity is properly prepared. The essayist has shown on the screen tonight a number of fillings that have failed because the cavity was not properly prepared to receive the filling. We must bear in mind that the fillings mentioned above were made in steel tubes and rested upon a solid foundation, but what can we expect of a filling which is inserted in a cavity without the use of a matrix, or without sufficient resistance at some point to allow of proper condensation? Every amalgam filling in an approximo-occlusal cavity should be inserted with the aid of a matrix, so that there will be no point of least resistance, in other words, so that the cavity is surrounded by four walls. I believe that as many teeth can be saved with amalgam as by any other means, and failures are due to poor quality of the alloy, faulty preparation, or faulty manipulation of the material.

As to cements, it is very natural, considering the present perfection of the inlay, to study the medium by which the inlay is held in position, because no matter how perfectly an inlay is made, it is useless unless the medium by which it is held in place is durable. The manipulation and the quality of cement, therefore, should be carefully studied, and I hope the essayist will continue his investigations.

Dr. S. C. G. Watkins, Mont Clair, N. J. I cannot allow this opportunity to go by without saying a word at least of commendation of the paper, the hearing of which has well repaid me for my trip here from New Jersey. This society is to be congratulated on having such a splendid exponent of amalgam and cement, and I admire his patience and perseverance in making these tests.

It is an old but very true saying that if a thing is worth doing at all it is worth doing well, and if we follow the teach-

ings that we have heard here this afternoon, I know that we shall all do better work than we have been doing.

The manufacture of amalgams is of very great importance to us. I remember years ago a dentist whose name is familiar to all of you made an amalgam which enjoyed a great reputation. Instead of using pure silver, this dentist used all government coin, which contained a little copper. After he died his formula went into the hands of one of the largest dental manufacturing companies in the world, and immediately the substance of that amalgam, or its working qualities at least, changed, although it was supposed to be made after the same formula. I have always felt that the government knew better how to melt silver and copper together than this manufacturing company did, because the amalgam certainly seemed better when it was made by the original maker.

Dr. A. P. Burkhart, Auburn, N. Y. I am very much interested in the paper presented by the essayist. As the last speaker said, we can hardly realize what a great amount of labor the essayist has performed. He has pointed out to us some of the failures and their causes. One of the causes of failure lies in the manipulation of the material as it comes to us, rather than in the possible chemical changes described. If the dental profession will use the material which the essayist has brought to our attention with the same care and discrimination as they use gold, I am sure that better results will be obtained. Many failures in the use of amalgam are due to careless manipulation. No filling can be placed in a tooth with satisfactory results, no matter what material be employed, unless great care is exercised in the preparation of the cavity and in the final preparation and introduction of the material itself, whether it be cement or amalgam. If the rules laid down by leading operators for the preparation of cavities for gold fillings were followed there would be fewer failures when amalgam is employed. There is no question in my mind that a greater number of teeth may be saved by amalgam than by any other material, although I admit that it is not always suitable. When the cavity is properly prepared and the rubber dam and a good quality of amalgam are used, there can be no question as to good results.

One speaker has said that a great variety of amalgams at almost any price are offered to the profession. My experience has shown that the very best is none too good.

Dr. H. B. Tileston, Louisville, Ky. I would like to ask Dr. McCauley, who has made these extensive experiments and who has been with Dr. Black, what alloy gave the best results, and what he considers a scientifically made alloy. I see no objection to discussing among ourselves what manufacturer is making a good alloy that we may use.

Dr. C. E. Woodbury, Council Bluffs, Iowa. More fillings of amalgam are made than of all the other materials. All amalgams should therefore be tested as to their efficiency, and the results should be published. I have no doubt that Dr. McCauley would be willing to make these tests and present the results to the society, if he were asked to do so, and this, in my opinion, would be the best way to bring this matter to the attention of the profession, because we are not in position to make these tests ourselves. It would be of value to us if Dr. McCauley would purchase a sample of the different amalgams in the open

market, test them, and give us the results of these tests.

Dr. J. N. Crouse, Chicago, Ill. I should like to know the conditions of the different metals used in the formulæ. The essayist's findings do not correspond with my experience. There seem to be too many errors in the different proportions, and the metals used probably were not pure. A pure amalgam cannot be obtained unless the metals employed are purified. Moreover, the alloying must be done so that the metals will melt uniformly, which is very simple if the proper apparatus is used. I made the first tested amalgam on the market; it was tested with instruments designed for this purpose before Dr. Black had published anything on this subject, and there is no alloy offered on the market that I do not test under the micrometer.

Dr. McCauley (closing the discussion). In reply to the first question raised, I would say that too much stress cannot be laid on manipulation; yet no operator, however skilled he may be, can successfully manipulate a defective alloy or amalgam and make a perfect filling. I do not want to detract anything from the importance of proper manipulation, but must emphasize the fact that the alloy must be a good one.

The question as to what alloy is best to use is the most difficult to answer. I have stated in my paper that in my opinion there is no alloy on the market today that can be depended upon, unless it is balanced according to the scientific principles of balancing alloys. I have also stated that there are less than a dozen manufacturers who are known to possess the proper instruments for this work. Dr. Crouse and others have these instruments, and I feel warranted in saying that the manufacturer who possesses them and uses them carefully in making his alloys, will produce a perfect alloy. There are a few manufacturers whom I know to possess this testing apparatus, but unless I could give the names of all, it would not be just to name these few.

Dr. Crouse inquired as to the purity of the metals in the alloys tested. The drawing shown was intended to demonstrate that small variations in the fineness of metals produce a great difference in the product of the alloy. It is practically impossible to secure absolutely pure metals in quantities sufficient for making alloys, and at a price which would warrant their use.

Dr. Crouse. You can have the chemist refine them for you.

Dr. McCauley. The head chemist of one of the leading chemical houses of this country told me that he could not guarantee the purity of silver nor could he guarantee equal fineness in every case. It is possible to obtain it 999/1000 pure, or even a little better, but absolutely pure silver is very difficult to obtain. Hence in making alloys we are forced to depend upon what we might call commercial silver, which is refined by a process applicable to large quantities such as are necessary in making alloys. No alloy that is not balanced by the manufacturer can be depended upon, and every practitioner should ascertain for himself whether or not the manufacturer is balancing his alloy.

Dr. Tileston. In the samples of cement passed around and showing the effect of shrinkage, the names of the manufacturers are indicated, and I do not see any objection to telling us what is the best alloy. How about Fellowship?

Dr. McCauley. If I were in position to do justice to all the manufacturers, I would make definite statements. I have

made cement tests for two years, but with amalgam I have experimented only a short time, and have not covered the entire field by any means. If I can make arrangements to have the continuous use of a micrometer and dynamometer, I shall test every amalgam obtainable on the market, and then shall report my findings to this society, indicating the name of the alloy and its behavior in a cavity.

I want to thank you for the kind reception accorded to my paper. If in the future I can be of any service to this society, it will be a great pleasure for me.

Dr. SUMMA. In dismissing this section, I wish to say that in my opinion this is a subject for the manufacturer and not the dentist, because the dentist is unable to conduct such tests at all times. We shall, however, remember Dr. McCauley's promise to give us the results of his experiments.

The section then adjourned until Thursday evening, at 8 o'clock.

THURSDAY—Second Session.

The second session of Section III was called to order on Thursday evening at 8.30 o'clock, by the vice-chairman, Dr. Richard Summa, St. Louis.

Dr. SUMMA. Before we begin with the regular program, I wish to say this: At a previous meeting of the section Dr. McCauley read a paper along the lines of the investigations of Dr. Black. Now, since Dr. Black published his investigations, all dentists have wondered what amalgam they should use. Dr. McCauley also stopped short of that, and a challenge was made to him to make investigations of the different amalgams and give us their names. Dr. McCauley accepted the challenge, and wishes a year's time to make the investigations. In order to do this work he asks that you send him samples of the amalgams you are using, and write upon the envelope the name of the amalgam and the date on which you send it. He will then make tests of the amalgams, and in a year's time report the results; he will give the names of the amalgams, and will not hesitate to make public his findings, and will be honest about it. In order to give this movement a little backbone, I have deemed it best to appoint a committee to take charge of this work. The chair appoints as such committee Dr. C. M. McCauley, Abilene, Texas, chairman, Dr. C. E. Woodbury, Council Bluffs, Iowa, and Dr. G. W. Dittmar, Chicago, Ill.

The Vice-chairman then announced as the first order of business for the evening session the reading of a paper by Dr. G. H. WRIGHT, Boston, Mass., entitled "(I.) A Group of Deformities of the Nasal Respiratory Tract, Coincident with Dental Irregularities. (II.) A New Instrument for Comparative Measurements, Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch," as follows:

(I.) A Group of Deformities of the Nasal Respiratory Tract, Coincident with Dental Irregularities.

(II.) A New Instrument for Comparative Measurements,

Demonstrating Changes in Nasal Fossæ when Readjusting the Maxillary Arch.

By GEO. H. WRIGHT, D.M.D., Boston, Mass.

A CONTRIBUTION in the *Dental Cosmos* for June 1911, entitled "A Study of the Maxillary Sutures," constitutes a basis for study of the underlying and fundamental bones involved in maxillary readjustment, and a brief synopsis of that paper at this time will not be out of place as an introduction to a better understanding of the internal structures of the nose, and the measurements to be made within the nose before and after expanding the dental arch. A study of the first paper is recommended as a means of better understanding the present report.

A STUDY OF MAXILLARY SUTURES.

We considered the palate, malar, orbit, nasal, ethmoid, and lacrymal bones, their processes and articulations. This led us to an appreciation of the various sutures involved. Let us note particularly the transverse facial suture, and also what a suture implies. When ossified it is no longer a true suture, although its former outline may be defined. Unossified, the suture has between its parts a fibrous connective tissue, capable of having its fibers stretched, with regenerated growth and subsequent ossification; and because this is so, the orthodontist is capable of assisting nature in the normal lines of growth, and thereby obtaining such remarkable results as are shown in the enlarged arch. It is necessary for us to reconsider the anatomy and histology of the turbinal.* This review of the anatomy and histology enables us to appreciate how variations from its normal position and structure may modify nasal respiration. Let us examine the internal nose in conjunction with these deformities, as a matter of record for future observation. Whenever we make an examination of the nose by means of the head mirror, reflected light, and a nasal speculum, we may note what structures vary from the normal, and make a record accordingly—as, for instance, of a deviation of the septum, collapsed nares, too close approximation of the turbinals to the septum or floor of the nose, etc. In order to do this effectively, it may be and frequently is necessary to cocainize the intranasal region to induce shrinkage of the mucous mem-

---

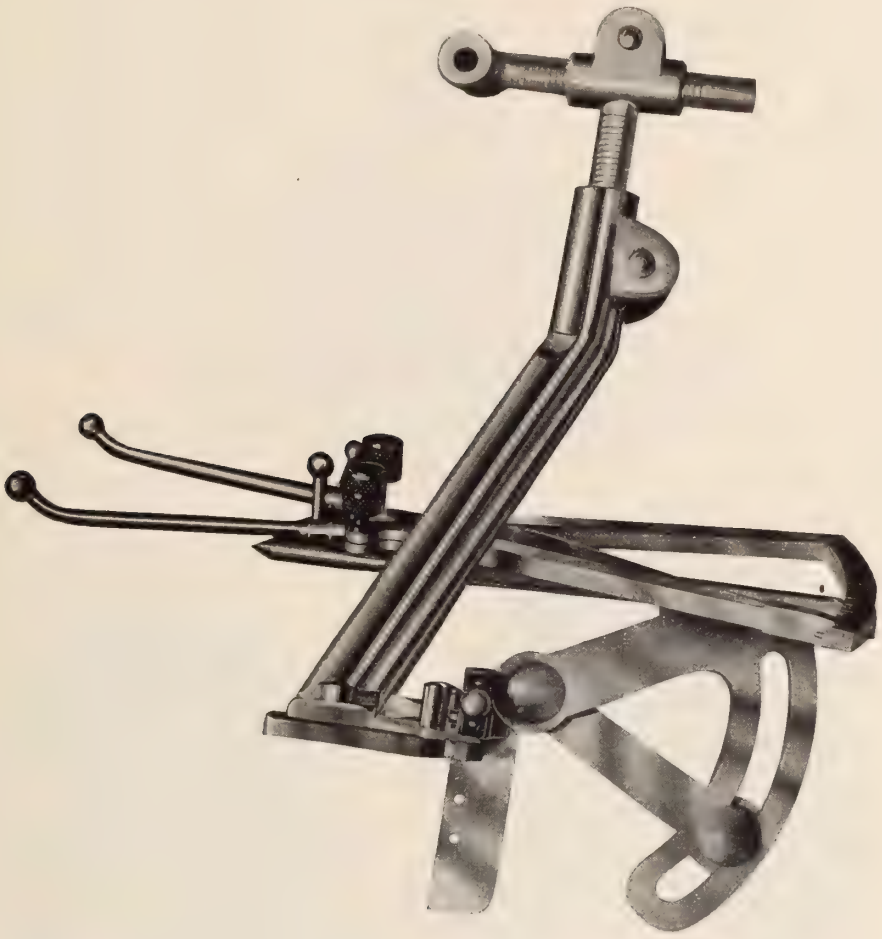
* (*a*) "A Contribution to the Secreting Mechanism of the Nose," by J. L. Goodale, *Annals of Otology, Rhinology, and Laryngology*, March 1905.

(*b*) Pilliet, "La Muqueuse des Fosses nasales et son Tissu erectile," *Tribune Médicale*, May 14, 1891.

brane, in order to obtain an unobstructed view.

Some of these obstructions are active for brief periods only, and as they appear suddenly, so they disappear spontaneously, often without treatment. Therefore the class of nasal obstructions which we shall examine are those which make their appearance gradually, with increasing obstruction to good breathing. This class is more likely to be associated with the almost imperceptible but steadily progressive dental deformity, and in either region, the nose or the mouth, there is no hope for a spontaneous cure.

FIG. 1.



Author's instrument for recording internal width of nose between antral walls.

PRACTICAL CASES.

A description of a few of the many practical cases which we have examined, measured, corrected, and finally examined and measured again, will indicate without too much repetition the value of this

work, and incidentally suggest a wider field for future study.

Dr. H. P. Mosher ("American Practice of Surgery," vol. vi) reports the examination and measurement of fifty skulls with a view of determining the operating distances to the sinuses. In this series he found an average antero-posterior depth of two inches from the lower edge of the posterior rim of the nasal opening to the choanæ along the floor of the nose, and with all other diameters, vertical, horizontal, and oblique, the variability was dependent upon the age, size, shape, and individual anomalies, as well as the racial type of the skull. So, too, in all measurements which we have made upon the living these factors are variable, and consequently we are forced to confine our estimates of change to a comparative measurement for each individual problem of nasal constriction or obstruction. (See Fig. 1.)

Case I. This was that of a boy of twelve years. The anterior upper incisors were in malocclusion, the laterals in lingual occlusion to lower teeth and irrevocably locked inside the arch. The premaxillary bone was small, but the teeth in it were well developed. Both anterior nares were collapsed and acted as valves with each inspiration of air. (Fig. 2, A.) The upper arch was contracted in the region of the bicuspids. The internal nose showed approximation of the lower turbinals to the septum, which deviated slightly above and below, making a double curve. There were no spurs or thickenings or otherwise marked disease conditions of the mucous membrane, except a slight redness and swelling. The boy could not breathe freely through the nose, and with difficulty could run fifty yards without much panting and heavy breathing through the mouth. His general condition was poor, his color anemic, and the patient altogether lacked stamina; was subject to frequent nasal colds. The distance between the antral walls below the lower turbinals before regulating the teeth was 10 mm., and after regulating, 16 mm.; between the first bicuspids before regulating, 23 mm., after regulating, 33 mm. After readjustment and obtaining good occlusion, the nose when examined showed the nares in good tone as compared with the former collapsed condition; the deviations of the septum were gone, and the turbinals were in relatively good position away from the septum and slightly raised from the floor of the nose, and there was no difficulty in nasal respiration. (See Fig. 2, C.)

Case II was that of a man of twenty-seven years. This patient presented a long and narrow face, a high, contracted, and V-shaped arch, and teeth in badly decayed condition. He was a mouth-breather and subject to head colds, and was below the normal in weight. The insurance companies had refused him insurance, considering him as a bad risk. A rhinologist, Dr. C. A. Coolidge, Jr., sent him to us, saying that he hesitated to operate on the lower turbinals where the dental deformity was so marked. For a period of three months we stretched the maxillary sutures, at the end of which time the incisors had moved apart, and, to his great joy and relief, the patient reported freedom in nasal breathing. It took me another fifteen months to adjust his teeth, during which time the patient's health improved in every way. The measurements between the antral walls before adjustment were $8\frac{1}{2}$ mm.; after adjustment, 15 mm.

Case III was that of a girl of eleven years. The abnormality of teeth was

not serious. There was a slight contraction in the region of the bicuspids. The arch was tending to the Gothic type. The turbinals on both sides were near

attention given to tooth regulation, by simply keeping the patient under observation and applying gentle force in maxillary expansion to lead the arch out

FIG. 2.

A, Showing collapsed anterior nares. B, Contracted dental arch and anterior deformity. C, Corrected arch, which resulted in wider nares.

the floor of the nose, and the measure of ease in breathing through the nose was variable, the patient being subject to nasal or head colds. We were impressed with the idea that, with a little

to normal, nature would complete the growth, and soon establish normal conditions within the mouth as well as in the nose. The measurements within the nose before treatment showed 12 mm.;

after treatment, 14½ mm. The turbinals were lifted from the floor of the nose; the floor assumed a declination of 2°, mal growth and expansion, and not assign to our apparatus all the glory. (See Fig. 3.)

FIG. 3.

A, Nares on right side normal. B, Right central incisors to molars in good expansion. C, Left lateral incisor to last molar in lingual occlusion. This dental deformity showed asymmetry up to floor of orbit.

and good nasal breathing-space was established. This case represents what we are pleased to designate as the unearned increment in maxillary growth and readjustment. We must recognize and credit to nature what she accomplishes in nor-

Dr. George Ainsworth of Boston told us of a case in which he was called upon to spread an arch that was comparatively uniform but narrow. The upper teeth on one side stood inside of the lower teeth, instead of occluding properly. The pa-

tient went to Canada for the summer, with an appliance in place. On his return in the fall, Dr. Ainsworth found that the dental arch had spread fully three-fourths of an inch, one-third more than was desired, and, as the patient, a lad of thirteen or fourteen years, expressed it when asked about his breathing through his nose, "It felt as though the north wind was blowing through as compared with what it was before."

NASAL DEFORMITIES COINCIDENT WITH DENTAL IRREGULARITIES.

We are able to cite and report many other cases of different ages and types, as we have up to date records of thirty or more cases. The significant facts are these: All these cases show some nasal deformity coincident with a dental irregularity. They all show a change in the width between the superior maxillary bones, measured between the antral walls below the turbinates, as recorded before and after regulation respectively. They all show improvement, some slightly and others in a marked degree, in intranasal respiration after maxillary readjustment, and in consequence enjoy a better nasal sanitation, ventilation, and drainage, better nasal respiration, and greater freedom from head colds. The factor of restored facial symmetry must not be lost sight of, although personally I am more inclined to emphasize, first, the importance of normal function of the mouth and nose, believing that, when this is secured, all other beauty and harmony will inevitably follow.

INFLUENCE OF MAXILLARY CHANGES ON THE EYE.

As an outlook toward the future, we shall cite a short statement by Dr. Wm. F. Daly, oculist, of Boston, with reference to these maxillary changes. The outlook, I believe, is pregnant with great things for the future, namely, the influences of maxillary readjustment upon the orbit. We have already studied the sutures of the orbit with the object of showing that any movement of the base of the superior maxillary bone—which, broadly speaking, is a triangle—must cause a movement of its apex, which is in the region of the floor and inner canthus of the eye, and this movement must induce ocular changes. Dr. Daly says:

> A train of ills associated with the growing period of the human face is found in the eye and its adnexa. Among such common troubles, not to point out their far-reaching sequelæ, may be mentioned the different abnormal refractive conditions—the various heterophorias and more pronounced anomalies of muscular dynamics, with resultant loss of vision of one eye in a large percentage of cases.
>
> These conditions have all been explained on various bases, and ophthalmic literature teems with complicated theory, with the result that sides are taken, schools and camps formed.
>
> Each new text-book in point of thoroughness carefully perpetuates old error, and in their reading both practitioner and student meet with a mass of conflicting evidence. Witness the war that waged for years, and for which even now no solution is found, concerning whether the poor vision of an amblyopic eye with a normal fundus is due to an acquired partial blindness from disuse, or whether there was an original congenital lack. The theories of amblyopia exanopsia (sive ablepsia) and Schweigger's counter theory of congenital amblyopia still find their adherents, and at least as far as text-book theory is concerned are as far from solution as ever. Like mistaken theory has given a decade of ruthless eye-muscle cutting, the futility of which, unless perhaps in an exceptional case, is recognized now by the profession at large.
>
> In looking for causation for all such con-

ditions, the search for the occult has caused the obvious to be overlooked.

A hitherto almost wholly unrecognized part among the etiological factors of heterophoria, amblyopia, and their train has been played by the bony orbit, and farther back by the factors which modify its formation. The average ophthalmic system or text-book recognizes this in but a trifling number of instances, whereas the exception is a rarity. Indeed, supporting any such view of orbital modification of ocular condition, one has but to review mentally the long-accepted ethnic facts concerning refraction—the brachycephalic Celt is hypermetropic as a nation, and the Teuton is myopic.

Highly important, if not pre-eminent in the modification of the shape of the orbital cavity, and consequently of the growth and function of the orbital contents, is the relation of the premaxilla during the plastic years. The wedge which thrusts a broad-based pyramid out and its apex in must of necessity modify markedly the cavity of which the pyramidal apex formed the inner and under walls.

When we consider that apart from all preconceived theories of origin, all heterophorias, squints, and amblyopias found coincident with heterophoria, make their appearance during the first six years of life, the period during which the wedge is either driven or not, is either faultily placed or negligently allowed to place itself, the intimate relationship of the conditions, their development *pari passu*, their intolerance of correction in later life, and other points in common, become strikingly significant.

Typifying this dependence of orbital malformation upon certain phases of facial maldevelopment may be instanced the half-apologetic and extenuating statement which ophthalmologists of any clinical experience have heard hundreds of times from mothers who present their children with beginning of developed squint: "Doctor, he was not born so."

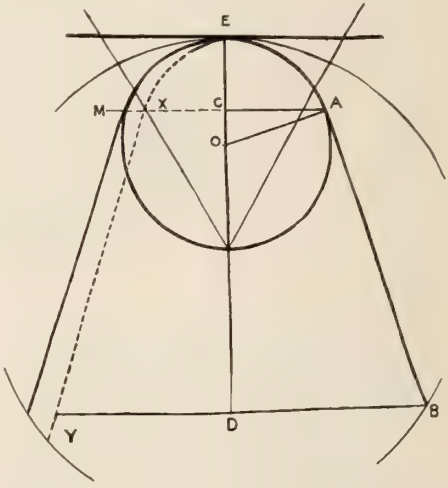
A report will be made later concerning the relationship in these cases of maxillary readjustment, of orbital measurement, growth, refractive, and muscular conditions. A number of cases are at hand, but because of their numerical insufficiency or because of faulty record they will not now be presented. It is hoped, however, by stating in advance the lines along which the work is being done, with an extended report later, to point the way to research which cannot but bear heavy fruit.

Measurements.

In order to round out and complete the study, we beg indulgence while we consider the mathematics for—

First: Determining the area of loss in mastication. (See Fig. 4.)

Fig. 4.



Author's diagram for analysis of the dental arch when deformed. Method for determining area of loss in mastication shown between outer line and inner dotted line.

Second: Determining the area of loss to respiration, when the anterior nares are in a state of collapse.

We have availed ourselves of the work of Dr. Bonwill and the subsequent elaboration by Dr. Hawley, whose formula for finding the extent of the normal arch is given in Johnston's "Operative Textbook." With this formula we have analyzed the component parts of the arch, and the lettered diagram (Fig. 4) will indicate briefly the method used to obtain the results.

From A, the point of tangency, drop a perpendicular to E D. From B drop a perpendicular to E D. A C D B is then a trapezoid, the area of which is $\frac{C D}{2}$ (A C + B D).

The area of E C A is then found as a semi-segment of the circle with known radius, O A.

We first secured good impressions in plaster both of the teeth and of the nose. Then, using Hawley's formula for determining the normal arch from the combined lateral diameters of the central, lateral, and canine, we constructed the geometrical figure that you are familiar with.

To this figure we added an outline of the dental deformity from the cast itself, which was carefully checked by measurements from the teeth within the mouth. One-half of the teeth being in normal occlusion, we wished to determine the area loss of mastication for the other half. The method employed for this purpose was as follows:

The area of the abnormal half is found by first finding the area of C X Y D as $\frac{C D}{2}$ (C X + Y D), then the area of E M X was approximated, and subtracted from the area found from the semi-segment E C A. This small area was found by considering it as a triangle, with the base M X, and the altitude of the portion of the circumference E X. It was then checked as carefully as possible by counting the individual squares of the co-ordinate paper. The difference between the normal and the abnormal half was found, on the co-ordinate paper, to be 128 mm. square. The difference between the normal and abnormal nares was 60 mm. square.

This brief outline is given as a suggestion of the method followed; if we attempted to give all the figures in the work, it might prove confusing. The results are what we want.

The nares were plotted on co-ordinate paper by making measurements on the plotted model from the median line and laying off the same distance on a given line on the paper, also verifying these from measurements on the living subject. A sufficient number of points were taken to make the apparent outline of the curve.

In approximating the areas, the normal breathing-space was considered as an ellipse, its area being found according to the formula, where A and B are the semi-major and the semi-minor axis. In the abnormal area it varies considerably from an ellipse by being flattened and at the same time indented.

The minor axis was necessarily only a rough approximate. The area, however, thus found was carefully checked by counting the number of small squares of the co-ordinate paper included by the curves, and then estimating the fractions of the squares as nearly as possible.

Variations in width of the horizontal line between the antral walls in skulls of different types in adults where no appreciable dental deformity exists show from 10 to 15 mm. at the entrance or the anterior third below the lower turbinal on the antral wall; thence backward toward the middle of the nasal fossa it widens and shows a range of from 12 to 18 mm.; it then decreases rapidly until we reach the choanæ, where Coakley gives the vertical height for an average range of from 1 to $1\frac{1}{4}$ inches, and the antero-posterior diameter along the nasal floor as from $1\frac{3}{4}$ to 2 inches.

In any event these measurements are only approximate—as they vary, as the

cephalic index varies, with the racial and facial types and admixtures, as well as with individual abnormalities.

Therefore at this time the principal value in our measurements of the intranasal space lies in the determination of the actual amount gained for each individual, and in knowing where that change occurs and recognizing its immediate effect on the organization as a whole.

The author wishes to acknowledge his indebtedness to Mr. Geo. W. Bowers for his care in constructing the measuring instrument, and to Dr. Arthur E. Joslyn, of the Harvard Medical School, for assistance in computing the areas.

Discussion.

Dr. A. Coolidge, Boston, Mass. From the point of view of the laryngologist, this subject is most important. Obstruction to nasal breathing is one of the most common symptoms for which his advice is sought, and he soon learns that some cases are as difficult to understand and treat as others are easy. The most difficult cases are those in which there are no obvious obstructions, such as adenoids or some inflammatory irritation or deviating septum, but in which the nasal cavities, more especially their anterior portions, are abnormally narrow, leaving insufficient room for the normal play of the constantly changing turbinated bodies. He learns by repeated observation that it is breadth and not height of a nasal cavity which favors easy breathing. A relatively large growth of the septum, as is frequently seen in the leptoprosopic skull of Siebenmann, associated with a high palatal arch, appears to favor nasal obstruction, while the relatively small septum, as an example of which we may take the negro, tends to be associated with broad cavities, a more normal arch, and more patent nostrils. It is the same class of cases, those with narrow arch and narrow nasal cavities, which present problems both to the dentist and the rhinologist. I will not go into the subject of the etiology of the bony development in these cases, except to say that it is still under controversy, and that there are evidently several factors to be considered. Of these the development of the premaxilla, which, as it bears the incisors, must necessarily readjust itself to its environment at the time of the second dentition, has undoubtedly a large influence. The reason why a narrow nose is not so good an organ as a broad one, even when its height is greater, is, as I have said, because there is too little room for the normal function of the turbinated bodies, especially the lower. In a high cavity the turbinates are long, in a narrow one they are necessarily nearer the septum. The turbinates have a wonderful power of adjusting themselves to fit the spaces which they occupy, and will often overcome by this adjustment what would otherwise be a pathological deviation of the septum, but they find more difficulty in carrying on their proper functions without sufficient space between themselves and the septum. The symptoms which we expect to find from nasal cavities which are normal in every way except in breadth are therefore what might be described as functional disturbances of the turbinates, and of these the one which the patient will probably notice is a periodic difficulty in getting as much air through his nose as he would like to. All nasal cavities become periodically narrowed by inflammations, such as a cold in the head, by nervous disturbances, or even by posture, as in lying down at

night, but those in which the natural play of the turbinates is restricted will suffer the most.

How does the rhinologist try to correct these symptoms? If there is no other cause for obstruction, he must attack the turbinates, which in themselves are entirely normal and functionating organs. Sometimes by applications or cautery he may give them a hint, as it were, that their erections should be more restrained, but if this is not enough, he must reduce their size. A little reduction of tissue may give the desired result. But a better way, if he could accomplish it, would be to give them more room.

This I hope is a brief explanation of the great help that the dentist will give to us if he can carry the naso-antral walls, and with them the lower turbinates, away from the septum. Why or how a force applied to the teeth or even to the alveolar processes does this, I will not take up. They are both parts of the same bony structure; if the alveolar processes can be moved outward, I suppose the external nasal walls have to go with them. The important fact is that it can be and has been done.

Dr. Fred C. Cobb, Boston, Mass. Dr. Wright asked me to say a few words with regard to the influence of nasal deformities from a bacteriological standpoint. The experiences in bacteriology of the nose that we have had lately have been extremely interesting. The nose is a very strong sifter of bacteria. For years it was noted, after septal and other operations in the nose, that the wounds healed remarkably well, and the natural conclusion was that the nose was sterile from a clinical standpoint. Yet, from cultures made by many excellent investigators, the nose was found to contain bacteria, and it was impossible to introduce instruments inside the nose without introducing bacteria. Some English investigators finally decided that there were bacteria on the hairs of the nose. On disinfecting the hairs they found that in about 80 per cent. of cases sterility of the nose could be effected. Dr. Inglis and I have disinfected the hairs in the nose in all sorts of ways and with all sorts of agents, and we have finally succeeded in obtaining sterility of the interior of the nose in 95 per cent., after the hairs have been properly disinfected. As corollary it is very interesting to note the effects of the constant presence of all sorts of bacteria, streptococcus, staphylococcus, etc., in the nose, some of which with every breath are drawn from the hairs into the nose. French scientists have been experimenting with the nasal fluids and have found that they are not antiseptic. These fluids were withdrawn and examined under artificial conditions. If bacteria are introduced in the nose, they do not grow; the fluids of the nose, therefore, must be antiseptic, and the hairs serve as strainers to prevent an excess of bacteria from being introduced. The hairs of the nose and the constantly exudated fluids kill bacteria and render them inert. As an example, I have drawn perfectly pure Klebs and Loeffler cultures of diphtheria, which were confirmed by the Harvard Medical School, from the hairs of a woman's nose who had applied for treatment of nasal catarrh. She had no diphtheritic membrane in her nose, and no thermic or any other symptoms of the disease. She was watched for some time, yet she failed to exhibit the least symptom of diphtheria. These Klebs and Loeffler bacilli must have been arrested by the hairs of the nose and killed by the nasal secretions. If the nose is blocked, this function of the nasal secre-

tions is obliterated, and although the oral secretions may to some extent neutralize bacteria, there is little question that they do not neutralize them as perfectly as do the nasal secretions. Dr. Wright therefore has rendered us an important service by demonstrating how to widen the nose.

In this connection I am forcibly impressed with both the great advantage and the great disadvantage of specialization. In the nose and throat clinic of the Massachusetts General Hospital we have for years generalized upon the shape of the nose; we considered that adenoids alone were responsible for nasal obstructions, and that deviations of the septum had a great effect on the nose. Now another specialist presents his specialty, combines it with ours, and shows us another point. In other words, the specialist ought not to rely on himself and his own particular specialty, but should always realize that there are a great many other specialists who could help him remedy his own defects and improve his work. One of the great shortcomings of medicine has been that we have not relied enough upon each other, that we have occupied ourselves too much with one organ, instead of duly considering the neighboring organs.

Dr. Edwin C. McDowell, Harvard Univ. To one interested in heredity two questions are suggested by Dr. Wright's paper, these being: Are such abnormalities of the teeth inherited, and if they are inherited, will the cure be inherited, after the abnormality has been corrected in the way Dr. Wright has shown? I shall take up the first question, and in regard to the second give a perhaps brief suggestion.

Numerous statements have been made that defects in the teeth are inherited. There seems good reason for believing that this is true, since there are a great many data showing that inheritance in general is a definite factor.

I may cite two classes of well-defined examples. One of these is the abnormalities of the feet and hands, cases of syndactylism where fingers or toes have grown together, this union of fingers or of toes having been passed down from generation to generation in perfectly orderly succession. Another example of this class is brachydactylism, in which, instead of having three joints, all the fingers are thumbs, two bones having become joined. This has been well shown. The cloven foot, a more advanced stage of syndactylism, in which the foot is divided and there is one great claw on each side, is a horrible deformity, which occurs regularly generation after generation.

A second class of abnormalities is irregularities of the eye. Cataract, color-blindness, night-blindness, irregularities of the retina, total or partial absence of the retina—all these I would cite as cases of inheritance, and it would seem likely that such conditions as Dr. Wright has described are inherited. In my opinion dentists have a very remarkable opportunity to find out whether such conditions may be inherited.

In animals, inheritance has been studied with great facility. In man, of course, intermarriage renders the study of inheritance very difficult, while in experimental breeding this difficulty may be overcome. There are many cases of heredity in animals, also in plants. These have been studied, and besides the mere fact of inheritance of certain characteristics, laws have been found which will enable one to predict in certain cases what the result of certain matings will

be. I wish to give you briefly an idea of the main law that has been established by experimental breeding. In animals, the color and the quality of the hair; in plants, the various sizes, the very many minute irregularities in seeds and pods and other seemingly unimportant details —have been most exhaustively studied. In animals the number of abnormalities is not great, and the color of the hair offers an easy index for the student of heredity to start with.

I shall cite one case to illustrate Mendel's law, upon which all the more advanced experimental work in heredity is based at present. The fact of the inheritance of color may be shown in animals when a special variety of guinea-pigs, for example, breeds true. Black guinea-pigs, if of a regular stock, will always breed black, and will always be black no matter how long they are bred. A white guinea-pig, if of a pure race, will always produce white offspring when bred with other white ones. If a black and a white guinea-pig are mated, the offspring will invariably be black. This is the first part of the Mendelian law. The black dominates the white; the white recedes before the black, the black is the dominating, the white the recessive. It should be borne in mind that the animals used for those experiments must be of pure stock —the black guinea-pig must have come from black ancestors, the white guinea-pig from white ancestors.

If black guinea-pigs are inbred, we shall find some white guinea-pigs, one in every four being white. The facts that the white do not mix with the black, and that white guinea-pigs will appear in the second generation—*i.e.* entirely white, not gray or spotted with black—is the second part of the Mendelian law, namely, segregation.

The third point in this law is the fact that one in four in every litter of pigs is white, in a perfectly fixed proportion. If there are three pigs in a litter, they may all be black; if five, four may be black and one white, but in the long run this Mendelian ratio will always be maintained. Many complications of this law have been found to exist, and indeed this simple ratio is only found to exist in just such cases as I have described, with such a strong characteristic existing in the race, as in a white and a black guinea-pig.

I cannot pretend to go into an elaborate explanation of the cytology and of the mechanism by which this phenomenon may be explained, but may merely say that discoveries in the biological field have substantiated this law to such an extent that it has become the foundation of all the experimental work in regard to heredity.

It seems perfectly natural, indeed very likely, that these laws apply to man, as they also apply to plants of certain colors. Until the last two years it has been greatly doubted, and not proved, that the Mendelian law may apply to man. The scientist has been ready to accept such a statement if it could be proved. Public opinion, of course, was very averse thereto; the idea of man being subject to the same laws as the lower animals is unpleasant to many people. But from investigations that have been published since 1907, it seems that Mendel's law applies to man as well as to the animals, in regard to such characteristics as the color of the hair, eyes, and skin. We owe the most important investigation to Prof. Chas. B. Davenport, who was formerly associated with the Cytological Society of Cambridge, and is now director of the Brooklyn Institute biological lab-

oratory at Cold Spring Harbor. Through his work and efforts, data have been gathered from the study of which it has been shown very clearly that Mendel's law will apply to man. I cannot go into details further than saying in regard to the color of the eye that the black or dark eye is the dominant. If a representative of a race that has never had blue eyes were mated with an individual with blue eyes, the offspring would have dark eyes. In other words, blue eyes act as a recessive, while dark eyes dominate.

In man of course these conditions cannot be followed easily. The most careful and intricate labor is required, and after that has been done, opponents will question the validity of the data itself, and so it will probably be several years before the statements that I have made will be more generally accepted. Yet I believe that the most advanced investigators believe that Mendel's law applies to man also.

Here is an opportunity for the dentist to do a little research work. The greatest difficulty in collecting data for man lies in the lack of color. As to determining characteristics according to Mendel's law, a most exact method for determining abnormalities has been offered by Dr. Wright. By collecting such abnormalities in order to determine whether any of them are inherited, we may eventually be able to conclude from the corroborative evidence collected by dentists and students of heredity that such abnormalities come under Mendel's law.

I come to the second question: When such an abnormality is purely individual, will this individual have normal children? The cure of such an abnormality, provided it has been inherited, would be a complete one. It would come in the same category as any injury of the body, although popularly, for a long time and until very recently even among scientists, inheritance of acquired characteristics has been believed to be a fact. Many observations and cases studied have induced scientists to change their opinion. I should like to cite one interesting case which lends weight to the belief that acquired characteristics are not inherited.

A white guinea-pig was castrated, and the ovaries were transplanted from a black guinea-pig which came of pure black stock. The white guinea-pig had been tested before, and had produced only pure white offspring when mated with a white male. The ovaries of the black guinea-pig in the white guinea-pig grew, and the pig was mated with the same white male with which it had been previously mated. Four young guinea-pigs were obtained, and all were pure black. If there was any inheritance of acquired characteristics, if the tissues of the white guinea-pig could influence the germ cells within it during pregnancy or before—incidentally it should be mentioned that the transplanted ovaries were very immature, the black guinea-pig from which they were taken being perhaps two or three months old, so that no ova had been formed as yet—in this case some difference would have been expected. In this case two white guinea-pigs produced black offspring, the white guinea-pig not being able to affect the cells within her own body. This very recent experiment is considered to have great weight in reference to the question of acquired characteristics. If such abnormalities as Dr. Wright has described are inherited, there is great doubt whether the offspring of the patient in whom these abnormalities are corrected will be normal.

Dr. G. V. I. Brown, Milwaukee, Wis. We have been seeking an instrument

which could be depended upon for accuracy in intranasal measurements. Dr. Lea W. Dean of Iowa City devised one that has served this purpose quite well, and it is with this instrument that the measurements which I have reported were made. Until I saw Dr. Wright's instrument, I had not thought it possible to make one so perfectly accurate as his.

It is a gratification to me to hear a paper upon this subject, based upon such a complete theoretical foundation as the essayist has laid, because it is now about ten years since the first paper which I prepared on the separation and readjustment of the maxillæ for the purpose of widening the nares was read before this association. Since then some scientists have made very positive statements that this could not be done. With the evidence that Dr. Wright has adduced, it is impossible to deny any longer that the nares can be widened by expanding the upper arch in such manner as to spread the maxillary bones. I have proved this by taking green skulls and showing a wide separation through the median suture, which we know does not close until well toward middle life. I put the limit at thirty years of age, but I think Dr. Wright has gone beyond this, even to sixty years.

Dr. WRIGHT. Over fifty years.

Dr. BROWN. Up to thirty years of age, in the average individual, it is fairly safe to undertake the separation of the maxillary bones in from ten days to two weeks, and to produce promptly an increase in the size of the nares. A more effective nasal improvement is thus secured than one unfamiliar with such treatment would expect, and the results have been confirmed by actual measurements.

It occurred to me some time ago that if we can correct, as we believe we do, deviated nasal septa and contracted nares by spreading the arches, by inhibiting the growth of the upper dental arch so as to prevent it from growing wide across the palate, we ought to be able to produce these defects. I therefore took a litter of pups eight weeks old, and with a wire passed above the palate across the floor of the nose, and attached to silver plates held at each side against the maxillary bones in the malar region, made slight compression. Not as much force was applied as would be necessary to reduce a cleft palate, but just enough to make the relation of the noses of these dogs in the region of the bicuspids the same as that in children whose upper bicuspids are slightly in lingual occlusion; in other words, to place the dogs' teeth identically in the situation in which we find them in approximately ninety per cent. of the children who require orthodontic treatment. When these pups were six months old, estimating that this would approximately represent the age equivalent to six years in man, they were killed, and sections of their jaws were made. I present [exhibiting] illustrations of sections of the head of the control pup that was not operated upon, but was given the same food and care as the experimental pups, and similar sections of the heads of those pups that were operated upon as described. If you examine these illustrations, you will find that at the point where only slight compression was made (other results depending entirely on preventing a growth across the upper dental arch) the nose is almost completely obscured, the nasal septum is markedly deviated, and there is a very much enlarged maxillary sinus. These experimental pups were exceedingly nervous, thin, and emaciated, although they were provided with the same food as the control pup. The control pup grew very well, while the others did not.

Dr. WRIGHT (closing the discussion). There is very little more that I wish to add, excepting perhaps that I should hesitate quite seriously to attempt to open the palatine suture or any suture in a young and growing child in the short period of two or three weeks, or even two or three months. I am inclined to be more conservative. My experience to date has convinced me that it is better to proceed slowly in the application of force in opening these sutures. In cases in which the force has been misapplied, the patient has encountered troubles in the region of the floor of the orbit, and some other tissues. In my opinion, it is best to copy as nearly as possible the orderly growth of nature. If we keep close to what we call normal physiological limits, we shall not go far astray. I think, however, Dr. Brown is justified in opening the suture in the palate in order to give relief for intranasal breathing as soon as possible. This is what I have been pleased to call the unearned increment of maxillary expansion. If we apply a little force to get that result, and this constantly applied force begins to act more quickly than normal growth, and nature adjusts the parts and produces normal growth, we obtain what I call the unearned increment, *i.e.* we have set the forces of nature to work to bring about the desired result.

I am obliged to you for your sympathetic interest. If the result which I have described to you will help to impress you with the fact that these sutures can be opened and that these bones can be moved by a simple means, we have made a forward step in the advancement of this important subject.

The next order of business was the reading of a paper by Dr. A. C. FONES, Bridgeport, Conn., entitled "The Necessity for and Training of a Prophylactic Assistant," as follows:

The Necessity for and Training of a Prophylactic Assistant.

By ALFRED C. FONES, D.D.S., Bridgeport, Conn.

HERE is the proposition: After a patient's mouth has been restored to a sound, sanitary condition, what system of treatment in the office can the dentist offer to that patient in order to maintain such a condition in his mouth, year in and year out, at a reasonable expense, to prevent future dental diseases? In other words, has the dentist any system for the prevention of dental diseases? If not, what is the reason?

DENTISTS' AND PATIENTS' DISREGARD OF ORAL HYGIENE.

Surely we know that dental caries can be almost entirely prevented by following a system of extreme cleanliness; we also know that Riggs' disease can be prevented as well as controlled, after surgical treatment, by following a system of cleanliness and gum-brushing. Is the reason for this failure to practice preventive treatment due to a lack of understanding or to inability to cope therewith unaided? The conventional dental practice of today is one that treats only with disease. Almost the entire attention of the practitioner is given to restoration of lost tooth structure; to put it plainly, we are a large band of scientific and artistic repair men. What a hopeless and uninteresting task to spend a lifetime following an endless

chain of dental caries and not lift a finger to stop it! The patient, dismissed from the chair today and pronounced sound, will no doubt, if no preventive treatment or instruction is given to him, return in a year's time, when from three to six new operations will have to be performed on his teeth. In this very city of Cleveland, I believe it would be safe to say that there are two million cavities in the teeth of its half-million inhabitants. Less than ten millions of people out of the ninety-two millions in the United States pay any attention to their teeth, except to have them extracted when they ache; yet examinations of the mouths of school children show that from seventy to ninety-seven per cent. are affected with dental caries. In fact, decayed teeth are accepted by the average individual as being normal, and a necessary evil of life. It seems superfluous to reiterate all the reasons why the mouth should be kept in a clean, sanitary condition, but the majority of dentists seem to be indifferent to preventive treatment. The average practitioner cleans the surfaces of his patient's teeth as the last procedure after he has finished his operation, this cleansing process usually requiring from fifteen to twenty minutes, and being performed chiefly for esthetic reasons, not with an understanding of its necessity for the health of the teeth, mouth, and body.

The mouths of the patients of the average practitioner are unclean, unwholesome, and in many cases repulsive. In appearance the teeth are without luster, the gold fillings tarnished, old amalgam fillings rough, and with a piece of a floss silk usually a shelf or shoulder can be detected protruding beyond the cervix of the tooth on the approximal surfaces. The gums are red and slightly congested at the borders. Calcic deposits can be found around the necks of all the teeth; in fact, the mouth shows conclusively that the new patient's dentist has been confining his entire efforts to filling the teeth, and has not appreciated the importance of treating their surfaces for the prevention of dental troubles, or realized the value of proper instruction of his patients in regard to home treatment by brushing, flossing, and using lime-water. Such a dentist will assure his patients that Riggs' disease is incurable. He is focusing his eyes only on the crowns of the teeth, and is quite oblivious to the fact that the foundation of a tooth is the root, and that the life and usefulness of its crown is dependent entirely on the freedom from infection, irritation, or congestion of the tissues composing or surrounding the root.

Before it is possible to make any great progress with the public appreciation of oral hygiene, the dentist must appreciate and practice prophylaxis himself, for each practitioner will then become an educational center, and can readily spread the teachings of prophylaxis to several hundreds of his patients.

FACTS AND RULES REGARDING ORAL HYGIENE.

Let us assume that the following facts are generally known:

(1) That ordinarily, clean teeth will not decay.

(2) That calcic deposits around the necks of the teeth irritate the gingivæ.

(3) That food débris decomposing around the necks of the teeth produces irritants and poisons which, in adult life, will kill the pericementum at its border, causing an absorption of the alveolus and the formation of a pocket.

(4) That rough and improperly finished fillings act as a foothold for food débris, rendering it impossible for the patient to cleanse his teeth properly.

(5) That red and bleeding gums usually show gingival irritation, and that the irritant must be removed. They also show a sluggish blood circulation through the capillaries, which can usually be corrected by proper gum-brushing.

(6) That it is impossible to sterilize the human mouth. Micro-organisms are harmless, unless they have a pabulum upon which to thrive, multiply, and become virulent and aggressive. Food débris is harmless unless acted upon by germ life. If we cannot get rid of the germs, we can surely get rid of food débris, and this is the principle upon which prophylaxis is based.

(7) That contact points are absolutely essential for fillings and for the health of interproximal gum surfaces.

(8) That an unclean mouth acts as an infecting agent for each mouthful of food taken into the body. No matter how clean and wholesome the food may be, it is infected by millions of active micro-organisms the moment the teeth close on it, and the individual eventually is apt to suffer from the products of bacterial digestion in the stomach and intestines, instead of profiting from natural digestion.

(9) That an unclean mouth not only produces many systemic disturbances of a very serious nature, but in childhood, if it contains decayed teeth which render mastication of food painful and create a habit of bolting the food, it constitutes a powerful factor in swerving a career from one of usefulness and advancement to one of retrogression, misery, and crime.

(10) In periods ranging from four to eight weeks, over the surfaces of the teeth in the average mouth, a transparent film is formed which defies removal by the tooth-brush. Around the necks of the teeth and under the gingivæ fine calcic deposits and a glue-like substance composed of mucous and food débris accumulates, which the brush cannot reach and the floss silk does not remove. The patient is unable to keep these surfaces clean and polished without our aid. To obtain the best results frequent prophylactic treatments are a necessity.

PROPHYLACTIC PRACTICE.

Many other reasons could be given why the mouth should be kept in a clean, wholesome state, but the main reason, the one which most interests our patients, is that eighty per cent. of all dental operations can be prevented by teaching and practicing prophylaxis. This does not mean that we will not have to operate every day of our practice, but that we will eventually be able to take care of a great number of people and keep their mouths in a state of perfect health, with a minimum amount of nerve strain both for our patients and ourselves.

Our practice will gradually change from one of disease to one of health. Alveolar abscesses will be rare; exposed pulps will be infrequent, and only as we take new patients into our practice shall we be obliged to contend with the painful side of dentistry.

WOMAN BEST SUITED FOR PROPHYLACTIC ASSISTANT.

If this idea of establishing a system of preventive treatment in his practice appeals to a dentist as it should, the question will now arise, How can it be done? A busy practitioner cannot comfortably do this work alone, unless he limits the number of his patients to comparatively

few. He must have aid, and I believe the ideal assistant for this work to be a woman. A man is not content to limit himself to this one specialty, while a woman is willing to confine her energy and skill to this one form of treatment. A woman is apt to be conscientious and painstaking in her work. She is honest and reliable, and in this one form of practice, I think, she is better fitted for the position of prophylactic assistant than is a man.

In order to systematize this work and render it really effective, also to lessen the expense to the patient, we must have such an assistant. It is a mistake to imagine that inaugurating such a system of preventive treatment in one's own practice involves an extra burden. The most difficult task lies in the training of the assistant, and in converting the patients. If I were to start anew in this work, I would issue a carefully prepared statement to my patients, explaining prophylaxis and what I believed it would do for the prevention of dental diseases, and invite them to try this system for a year. This would save much preliminary talking on the dentist's part, and invite intelligent questioning from the patients. After thorough demonstration and instruction in brushing and flossing as home treatment, and after having undergone at regular intervals instrumentation and polishing as office treatment, I believe that at the end of the year the patients would require no urging to continue this system.

TRAINING OF A PROPHYLACTIC ASSISTANT.

We must realize that at the present time there is no school for the training of women in this specialty. The small number of dentists who have prophylactic assistants were either obliged to train them or to secure dental graduates who had some knowledge of the work. This is the pioneer period, and until the demand becomes so great that our dental colleges will feel obliged to establish a special course for the training of such assistants, we must educate these women ourselves in our own offices.

Three possibilities as to source present themselves in the securing of an assistant: First, a woman who has served as assistant to a dentist, and who is already acquainted with his patients; second, a trained medical nurse; third, the possibility of soon establishing prophylactic treatments in our public schools for the prevention of dental caries, and the consequent training of young women for this work. These school clinics would become a school for prophylactic assistants, from which the profession could be supplied.

TRAINING A TIRO FOR PROPHYLACTIC WORK.

Let us consider the first one, and I will explain in some detail how I trained my assistant. She was first given drawings and books from which to study the anatomy of the teeth and their surrounding tissues. Next, natural teeth were secured from a dentist who makes a specialty of extracting, and these were arranged in warm modeling compound in the positions which they normally occupy in the mandible. The surfaces were smeared with ink, and she was then instructed to remove every trace of ink from the teeth with an orange-wood stick and wet pumice. This first operation took nearly all day. The teeth were again covered with ink, which was then removed in a shorter space of time. Again and again this operation was repeated, until her muscles became trained

in manipulating the stick, and at the end of two weeks she could clean the set of teeth in one hour's time. At the lunch hour she sat in my chair, holding a hand mirror, and watched me as I went over her teeth with stick and pumice, and while polishing showed her the thumb rests for the hand to secure pressure and prevent slipping. At last I became the victim, and with the hand mirror watched and instructed her while she worked in my mouth. After a month's training I felt that she was competent to polish the teeth of children. This she did for quite a while, and in the meantime I instructed her in the use of a few instruments. She watched me while I operated on patients. Again she became the patient, watching me with the hand mirror, and in turn I became the patient. In the first half-dozen lessons with the instruments, the chief instructions consisted in what not to do. During the first six months of her practice, only the heavy deposits of tartar were removed by her, but I found that by doing this preliminary work only she was saving me a great amount of time. Gradually her technique and sense of touch improved, and today, after she has practiced for seven years, I can find no fault with the results we are obtaining.

TRAINING A MEDICAL NURSE FOR PROPHYLACTIC WORK.

In training a medical nurse for this work, I would pursue a similar course. I think there would be some advantage in having a trained medical nurse. Her course of lectures and training at the hospital would be of advantage to her, and the confidence of the public in the work and service of these women is already established. I believe there would be no difficulty in securing trained nurses at a reasonable price, to start with, to do this prophylactic work. Trained nurses receive on an average twenty-five dollars a week; but their time is not always engaged, so that, in the course of a year, they might not average over fifteen dollars a week. The hours of a dental practice would be more attractive to most of these women than the continuous hours of nursing, and in my opinion it would not be difficult to secure their services for this prophylactic work.

TRAINING PROPHYLACTIC ASSISTANTS IN PUBLIC DENTAL CLINICS.

If, however, we, as a profession, are to stay the flood of dental decay, prophylactic treatment must be established in our public schools. I believe that women during the first year would give their services almost free for such work, since the training which they would receive would fit them for the desirable positions as assistants in dental offices.

If we could have dental clinics conducted along the following lines, our ideas regarding a school for prophylactic assistants would be realized.

Suppose it were possible to secure a room in one of our large school buildings and equip it with fifteen dental chairs, brackets, compressed air, washbowls, sterilizers, etc. Beside these chairs stand fifteen women in white costumes. Two are dental graduates and are paid a salary, and their duties consist of relieving poor school children of toothache, and doing what they can in operative work with cements, alloys, and gutta-percha. The other thirteen women are being trained as assistants, and are giving prophylactic treatments to the retarded children and those most needy of such service.

Instructions are given in brushing, brushes are supplied to those unable to

buy them, records are kept in order to keep in touch with each child under treatment; in short, everything possible is done to prevent dental caries and promote oral hygiene. Local dental societies could appoint members to lecture to these women. Possibly arrangements could be made at the hospitals for their attending some of the lectures for nurses, or in cities where there are dental colleges they might be permitted to attend those lectures which would be most helpful in their specialty. High-school graduates give their services almost free for the first two years at the training school to become teachers. The salary which they could command as prophylactic assistants in dental offices would be a considerably higher one, especially after a few years' experience, than they could hope to receive as teachers. Under such conditions I believe it would be possible to secure intelligent women in our school clinics at a very small salary, for the first year at least. In this way a double service to the public could be established. The school children would be greatly benefited by treatments and lessons in oral hygiene, and the dental profession would have a source of supply of prophylactic assistants. In Connecticut a provision is made in the dental law permitting the employment and practice of such assistants. I believe that eventually all states must provide for this much-needed practice.

Some may think that these assistants should be dental graduates. This I believe is unnecessary, for in either case it is chiefly a question of the development of a delicate touch and the training of special muscles, both of which require time and practice to accomplish. It is doubtful if the woman graduate would be content to confine herself to prophylaxis alone. I believe that the dentist should have each patient come under his observation at regular intervals, possibly once in six months, for a thorough examination of the mouth and a thorough prophylactic treatment. If he does not give these treatments himself, how can he know that his assistant is thorough in her work? Personally, I consider prophylaxis as being first, and operative work as secondary in importance in my practice. If the dentist does not perform these treatments himself periodically, I believe he will become the assistant, and the patients will consult the prophylactic operator as to the condition of their mouths. He will merely be called upon when there is repair work to be done.

In closing, I wish to say that the dentist who is not experiencing the pleasure of having every patient in his chair present a clean, sanitary mouth, with pink gums and polished teeth, is really missing the ideal in dentistry.

Discussion.

Dr. C. M. WRIGHT, Cincinnati, Ohio. When a man has given his mind to the consideration of one subject for a number of years, it is a special delight to him to find another who not only fully appreciates the importance of that subject, but can present it in such a clear and logical manner that all must accept it as a truth. For years I have urged this point in regard to prophylaxis, that dentists do not and will not perform the necessary fundamental prophylactic operation of treating *healthy* teeth and gums. They will not grasp the idea clearly that preventive surgery of the mouth, which consists of cleaning and polishing all surfaces of the teeth, must be considered essential in

practice, before the ever-present factors of disease can get a foothold. When we remember that the dental profession deals with less than half a dozen varieties of pathological conditions, and that but two diseases, viz, caries of the hard tissues and pyorrhea alveolaris, are the prominent ones which our profession is called upon to treat, it is astonishing that the clear principles of the theory and practice of prevention have been so sadly neglected. I have repeatedly proclaimed that the profession does not really care for prevention. Dentists, in the first place, will not themselves employ preventive measures, and secondly, they are not ready for preventive dentistry. A mouth is examined, first to find cavities of dental caries and next to find pyorrhea, a definite stage of a chronic disease of the gingivæ and pericementum, and if there are no evidences of these diseases the patient is dismissed as sound and requiring no dental service. Dentists have so persistently followed this course that I have urged as earnestly as I have been able the establishment of a sub-specialty, consisting of trained women whose distinct function shall be to keep the mouths and teeth of people *clean.*

Dr. Rhein of New York has earnestly advocated these measures, and proposes the name "dental nurse" for this subspecialty. He has laid stress on the importance of this work not for esthetic but for prophylactic reasons, and I have tried to have the dental college accept these women students for instruction in the practice of cleaning the teeth and massaging the gums—*i.e.* healthy teeth and healthy gums—in order to *prevent* disease. Every mouth can be benefited by skilful prophylaxis. It is a case of the well, not alone the sick, needing a physician.

Unfortunately the term prophylaxis is becoming misused, and is applied to *treatment* of a disease. "Prophylactic specialists" attempt even to *cure,* while prophylaxis in its proper meaning does not relate to curing. It means expert surgery for the prevention of a possible attack of disease, as Dr. D. D. Smith has so clearly demonstrated to the profession, and expert manipulative methods for the prevention of recurrence of a disease after surgical therapeutics have accomplished the "cure."

This clearly defined province of prophylaxis adds to the duties of the dentist another specialty of as distinct a character as the operative and the mechanical branches. The prosthetic, the operative, the orthopedic, the prophylactic, and the surgical dentist are practitioners of any one of these well-defined special departments of the science and art of dentistry, each of which requires special taste, talent, and training. How many fine gold operators, to use our professional parlance, do we know who cannot mold, swage, or solder in the construction of an artificial denture? How many operative dentists can really and skilfully perform that most important and yet that neglected operation of preventive dentistry, *cleaning of the teeth,* without injury to the delicate gingival festoons? The essayist in his paper has vividly shown the necessity for training in this neglected department of prophylaxis, and has detailed a method of training, and described the class of women who will be best suited for this training. The methods proposed appeal forcibly to me, as they constitute a system which, if followed, will revolutionize dentistry. While I have advocated and published schemes of education and theoretic curricula for adoption by colleges, I have

never been clear as to *how* to train the student in this novel branch. Dr. Fones' paper is worthy of the careful study of every dentist for his own sake, and of every college faculty desiring to educate practical prophylacticians.

Dr. M. L. Rhein, New York, N. Y. Without a careful reading of the essayist's paper, it is impossible to appreciate fully the argument so well advanced by him in behalf of preventive dentistry. The arraignment of the average practitioner for his shortcomings and the logical deduction as to the value of prophylactic treatment are generally accepted matters at the present day. The crux of the subject is found in the essayist's final analysis that this work will only be faithfully done for the many when assistants, not necessarily graduated dentists, are especially trained to perform this work under the guidance of the dentist. To stand shoulder to shoulder in the firing line with the essayist, I have agreed to take part in the discussion of this subject, but I crave your indulgence for too much personality. It is over twenty-eight years ago that I first read a paper on "Oral Hygiene" before the First District Society of New York, in which I endeavored to show the value of a clean mouth in the same way as has been done so ably by the essayist today. I have been unremitting ever since in my efforts in this direction. I soon discovered that calm, logical, and dispassionate argument produced but few followers. I refuse, however, to enlist among the demagogs or extremists who have injured the greatest advance in dental therapeutics by exaggerated claims and erratic pathologic doctrine.

Year by year I watched the sane advocates of a clean mouth growing in numbers, until in 1903 I thought the time ripe for a paper such as we have listened to. Twice in the spring of that year I presented the subject under the title of "The Dental Nurse." The first presentation, made at New Orleans before the Stomatological Section of the American Medical Association, met with such a cordial reception that, when I again presented that paper a few weeks later before the New York State Dental Society, I confidently accompanied it with a proposed legislative enactment to legalize and properly restrict the dental nurse. To my great disappointment my state society did not appreciate its opportunity to inaugurate this great progressive movement. On the contrary, a short-sighted opposition defeated my purpose.

Like every great issue in which justice and right must eventually gain the victory, this cause has been quietly but surely gaining strength both in numbers and soundness of doctrine, and has brought to us today the masterly protest of Dr. Fones which has thrilled this audience. The victory is, however, by no means won so easily. If it were merely a matter of proving the correctness of what the essayist has said, this question would long since have been settled. Unfortunately, it has reached a stage where the opposing forces consist of personal selfishness and aggrandizement, narrowness of conception, and shameless cupidity, as opposed to unselfish work for humanity at large.

The opponents of the dental nurse may be divided into three classes. First, the class of dental colleges which is governed by men who fear lest every radical movement may upset the frail foundation upon which their institution rests. The colleges which are governed by men who are working with the object of continually elevating the status of our profession have nothing to fear from this cause, and

they will be found among its strongest advocates. The second class is confined to a very small number of men so filled with conceit that the idea of a mere woman being able to wield an orange-wood stick with dexterity comparable to their own is in their eyes nothing short of sacrilege. All this opposition carries with it little weight, but the argument of the third class of opponents is of a different nature. This is composed of men who have never paid any attention to oral hygiene. Any requests of their patients for prophylactic work have been met with the superficial cleansing described by the essayist, which generally is a great evil instead of the benefit it should be. These practitioners know nothing of the "mouth beautiful" in their own practice, and are influenced in their vicious opposition to carrying the blessings of a clean mouth to the masses by everything but love for their fellow men. They appeal to the purse, to the cupidity of the dentist. They claim that the licensing of non-graduates to do prophylactic work would throw down the bars for illegal practitioners, and thereby take away a large part of the practice from the legalized practitioner. There is not a spark of evidence to justify such an opinion, but, on the contrary, a logical deduction as well as the experience of those employing dental nurses amply demonstrates that the opposite condition prevails. In other words, the dentists who have made use of the trained dental nurse have found that she not only adds to their own income but tends to rapidly increase their practice, and what is of far greater importance, strengthens the belief of their patients in the value of the dental services which they receive.

Even if the opposite conditions of affairs were true, and the danger from permitting free scope to the dental nurse were all that the opposition claimed, it would be most unethical for us to oppose it. What is our real position in the community? Are we professional men, or mere artizans of a trade? If we are doctors of the human body, dedicating our lives to healing and repairing the ills which we find in the oral cavity, then we are the priests of the people and true professional men; then everything that tends to further a better physiologic condition of the human teeth not only in our own practice, not only in our own country, but in the whole world, should have our first consideration, and as much of our material aid and assistance as we can afford, if we are to live up to the rank of a profession.

Dentistry, in its ideal conception of repair of diseased and broken-down structures and replacement of lost tissues, will always remain a luxury. Even with the poor understanding that we have today of the law of immunity, we realize that prophylaxis for the masses would be infinitely more valuable than the inferior tinkering which so many receive.

Is there any other way in which the gospel of a clean mouth can be brought to the multitude of school children—to humanity at large? There is no doubt in my mind that when the members of the profession understand this question sanely and appreciate it properly, they will be found espousing this cause.

It will then become a simple matter to legislate so that the dental nurse should have certain qualifications both in primary and professional education. These nurses will be restricted in the performance of work in the mouth to the simple removal of deposits and polishing the surfaces of the teeth and application of remedies. They will not be permitted to

practice on their own account, but confined to doing this particular work under the guidance of a legally qualified practitioner or the proper authorities of some public clinic.

Dr. N. S. HOFF, Ann Arbor, Mich. If we are to train only dental assistants in our offices, the plan outlined by the essayist is a commendable and a practicable one, and I am very glad to indorse it as such; but if we are to undertake the educating of skilled and intelligent assistants, who are to do real prophylactic work intelligently and scientifically, I do not believe it should be done in any such manner. If we are to give over the instruction of these assistants to the members of the profession in general, the large majority of whom will not take the time nor the pains to qualify themselves, what kind of a product shall we have, and what will be the effect on our professional standards? It would be very unwise for any college to add a professorship devoted to this subject and give such instruction as has been outlined here. I do not think many practitioners would be willing to sanction such a course, or to issue a certificate of competence, or even acknowledge that they had students of that kind under instruction. If the essayist means that we should instruct someone merely in cleaning and polishing the crowns of teeth, I very willingly agree that many apt persons, when trained, can do that kind of prophylactic work; but that is not real prophylaxis at all. Complete oral prophylaxis cannot be done by any such persons; it involves a great deal more and is of far greater importance than the simple polishing of the surfaces of the teeth. It requires many times as much intelligence and skill as the treatment of an abscess, or of necrosis, or of many other diseases we are accustomed to consider as demanding our highest skill and knowledge. I do not believe that any dentist would be willing to allow such an assistant to fill root-canals, much less to treat an abscess or disease which is likely to involve extensively the surrounding tissues of the teeth.

It seems to me undesirable to begin this work in the way proposed. If we cannot induce and educate enough dentists to undertake this most important work, I am willing to engage educated nurses and train them to polish the crown surfaces of the teeth, but I must object to calling this oral prophylaxis, for the reason that true prophylaxis involves a great deal more.

Time forbids me to outline my conception of oral prophylaxis. I have been working most carefully in this field for four years, and I have found it to be very much broader than I thought when I began. I am confident that no one can do justice to prophylaxis after only a few months' training, no matter who the instructor or what his system of instruction may be.

I do not wish to dissent entirely from the essayist's plan, as the provocation is great for the relief of the busy practitioner, but I hope that we shall not let our need influence us to bring disaster to the most promising field in preventive dentistry. Neither should we attach to our profession improperly trained specialists.

Dr. FONES (closing the discussion). I am a little surprised at Dr. Hoff's remarks. After having worked in the field of prophylaxis since 1900, and having practiced dentistry twenty-one years, I feel that I have a right to a decided opinion in this matter. Dr. Hoff will not treat this polishing operation so

lightly six or seven years hence. The work of these assistants is not intended to cover the entire field of prophylaxis. I am the prophylactic operator in my office, and the assistant merely helps me to prevent dental diseases. In a new patient, all teeth are placed in a perfect condition as I conceive the meaning of this term, and my assistant aids me in the future surface treatments for prevention. Our records show that by following a definite system of home care and office treatment, future operations can be reduced fully eighty per cent. When Dr. Hoff makes light of this treatment by polishing, he does not realize its wonderful results. I have great respect for his ability and believe him to be one of the cleverest men in dentistry, but he does not seem to appreciate why I advocate a prophylactic assistant of this type. The polishing of the surfaces of the teeth is but a branch of prophylaxis. But what dentist wishes to spend all day in polishing teeth? I would give up dentistry if I had to do that. What is there in dentistry for a man of ability and intelligence, if he is to spend his life polishing teeth? Yet, if these wonderful results are to be obtained, this polishing must be done, and the employment of an assistant seems to be the only solution.

Dr. Rhein has made one remark that I wish you would all remember, namely, that good operative dentistry will always remain an expensive luxury. The masses need prophylaxis, and these surface treatments of the teeth can be given at a reasonable enough price so that they will be within the reach of those who cannot afford the luxury of good dentistry. Prophylaxis must be inaugurated in the public schools for the benefit of the masses.

The next order of business was the reading of a paper by Dr. W. H. O. McGehee, Cincinnati, Ohio, entitled "An Experimental Study of the Tooth-staining Properties of Various Colored Dentifrices," as follows:

An Experimental Study of the Tooth-Staining Properties of Various Colored Dentifrices.

(A Research Conducted in the Laboratories and Clinics of the Ohio College of Dental Surgery.)

By W. H. O. McGEHEE, M.D., D.D.S., Cincinnati, Ohio.

In a paper entitled "Rationalism *vs.* Empiricism in the Selection of Dental Remedies," read by me before the Cincinnati Odontological Society, December 30, 1910, and published in the *Dental Brief* for May 1911, I mentioned the well-known fact that discoloration of tooth structure may be produced by the use of such agents as silver nitrate, the essential oils, iodin, potassium permanganate, and other drugs. I also at that time made the significant statement that *Colored mouth-washes or tooth preparations of any kind constantly used on exposed dentinal surfaces will be absorbed into the dentinal tubules and produce staining, consequently they should be discarded in favor of colorless preparations.*

DISCOLORATION OF TOOTH STRUCTURE BY VARIOUS DRUGS.

The idea that discoloration of tooth structure is produced in the mouth by the constant use of colored dentifrices is one which has lain more or less dormant in my mind for some years, and I cannot remember when it originated. I had heard, at intervals, complaints on the part of patients that certain dentifrices caused their teeth to turn dark, but paid no particular attention to them at the time they were made. The statement, however, of this idea in the paper, as just mentioned, was made after some thought and with a firm conviction that it was true, although I had at that time collected very little evidence of its veracity. Several months ago the importance of the subject and the persistence of the thought took such a firm hold upon me that I decided to begin an investigation of the entire subject of discoloration of tooth structure by drugs and proprietary preparations in general.

I immediately began a search of medical and dental literature for all the evidence I could bring to bear on the subject, and was surprised to find how little has been written and how meager is our knowledge, in regard to discoloration, of the action of the various drugs and formulæ which we are using in the mouth.

Every dentist is familiar with the brief statements made by various writers in text-books and journals, that oil of cassia will stain tooth structure, and that mercuric chlorid, iodin, iron salts, potassium permanganate, silver nitrate and other drugs will produce discoloration when brought in contact with dentinal matter. Buckley(1) has brought to our attention the fact that hydrogen dioxid, when brought in contact with blood in a root-canal, has a tendency to discolor the dentin through the formation of ferric oxid, and the same author(2) makes the statement that the use of dialyzed iron and tannin in combination will produce discoloration under similar conditions owing to the formation of iron tannate. Burchard(1) divides stains of the enamel and dentin as follows:

(1) *Metallic stains*—due to copper, iron, manganese, mercury, lead, nickel, silver, gold (chlorid).

(2) *Non-metallic stains*—such as green stain, black stain (tea, coffee, and iron sulfid during putrefactive decomposition), tobacco stain, red stain (chromogenic bacteria).

Kirk(1) and Buckley(3) have elucidated most of the phases of discoloration of tooth structure from putrefactive decomposition of the pulp. Kirk(2) has offered a plausible explanation of the causes producing the so-called "pink teeth." The *Dental Cosmos*(1) describes under the name of "Chiaie teeth" cases of brown or black discoloration of the enamel of teeth to be found in certain parts of Italy, due to causes not well understood. S. D. Boak(1) and others have described the red stains produced in the mouths of the Filipinos, Moros, and other oriental peoples by the chewing of the betel-nut. Prentiss in *Dental Cosmos*(2) calls attention to a brownish discoloration which he terms "saprogenous disintegration," the cause of which is in doubt.

SCOPE OF EXPERIMENTS.

The above brief *résumé*, although many authors who have contributed to this subject have not been mentioned, almost covers our present knowledge of the ques-

tion of discoloration, the subject of discoloration by drugs and pigmentary matters in dentifrices and other mouth preparations having been almost entirely neglected by writers and investigators.

The experiments recorded in this paper were begun, together with others made with many colored drugs that are used in the mouth, only a few months ago; but, owing to the limited time at my disposal, I have been forced temporarily to abandon all of them except those immediately bearing on the subject of this paper. They offer an attractive as well as extensive work for laborers in the field of research, and I expect to continue my observations when time permits.

The work accomplished on the dentifrice phase of the discoloration problem is by no means complete, although it has involved an immense sacrifice of time and labor. It could not have been continued without the assistance of friends and students, to whom I desire to acknowledge my thanks. I have figured that approximately 1500 hours have been spent by myself and assistants on this work.

CLASSIFICATION OF DENTIFRICES.

For purposes of study, dentifrices may be classified as powders, pastes, soaps, and washes. These may be divided into those which are colorless, or practically so, and those which are colored. Of the colored preparations, the majority are given a distinctive color by the addition of some coloring agent or dye, while others have the color resulting from the mixture of their constituents. Where an artificial coloring matter or dye is used, as a rule it has no particular medicinal value, but is simply incorporated in the mixture to improve its appearance and promote its sale.

CLASSIFICATION OF COLORING MATTERS.

Coloring matters or dye-stuffs are obtained from the vegetable, animal, and mineral kingdoms. Many which were formerly used are rapidly becoming obsolete, while others have been practically abandoned since the advent of the immense list of synthetic preparations recently introduced for this purpose.

The following classification of coloring matters is taken from Arthur G. Green's edition of Schultz and Julius' work entitled "A Systematic Survey of the Organic Coloring Matters."(1)

Group 1. Nitro coloring matters.
" 2. Monoazo coloring matters.
" 3. Disazo coloring matters.
" 4. Trisazo coloring matters.
" 5. Tetrakisazo coloring matters.
" 6. Nitroso or quinone-oxime coloring matters.
" 7. Stilbene coloring matters.
" 8. Oxyketone, oxylactone, and oxyquinone colors (excluding anthracene derivatives).
" 9. Diphenylmethane coloring matters.
" 10. Triphenylmethane coloring matters.
" 11. Xanthene coloring matters (pyronins, phthaleins, eosins, and rhodamins).
" 12. Acridin coloring matters.
" 13. Anthracene coloring matters.
" 14. Indophenols, indamins, and allied compounds.
" 15. Azins and azonium coloring matters (eurodins, safranins, indulins, and rosindulins).
" 16. Oxazin coloring matters.
" 17. Thiazin coloring matters.
" 18. Thiazol or thiobenzenyl coloring matters.
" 19. Quinolin coloring matters.
" 20. Sulfid coloring matters.
" 21. Indigo and derivatives.
" 22. Natural coloring matters (derivatives of pyrone, xanthone, isoquinolin, and others of unknown constitution).

Under this classification are described 711 various coloring matters used in the industries, arts, and sciences. Some

which were formerly used are now almost obsolete and are not included in that list. I shall mention a number which are omitted, but which are being recommended for coloring dentifrices by various authorities. As will be readily recognized, the great majority of the above groups are coal-tar derivatives, while a number in the last two groups are now also being made artificially or synthetically.

COLORING AGENTS.

Following is a table giving the name, synonym, source, shade, and as far as possible the percentage of employment of a majority of the various coloring agents used in dentifrices. Some of these are being employed in the many proprietary preparations on the market today, while others are recommended by various authorities in formulæ culled from many sources. In accumulating the names and the percentage of employment of these preparations between four and five hundred American, English, German, and French formulæ have been examined:

1. COCHINEAL (*syn.*, carmine, cochinille, carmine lake). *Dyeing principle*, Carminic acid. *Source*, Dried bodies of the female cochineal insect—Coccus cacti of Mexico and Central America. *Color*, Red, deepened by addition of alkalis. *Percentage of employment*, ¼ to 6.
2. CUDBEAR (*syn.*, archil, orchil, orseille). *D. prin.*, Orcein. *Source*, Various species of lichen belonging to the families of Roccella and Decanora. *Color*, Reddish brown. *P. c. of empl.*, 1 to 6.
3. ALKANET. *D. prin.*, Alkanin. *Source*, Root of Alkanna tinctoria or Anchusa tinctoria. *Color*, Violet red. *P. c. of empl.*, ¼ to ½.
4. HEMATOXYLON (*syn.*, logwood, Campechy wood, Blauholz, hematin paste and powder). *D. prin.*, Hematoxylin and hematein. *Source*, Wood of Hæmatoxylon campechianum, of Central America, Cuba, Hayti, etc. *Color*, In alkalis, purple to violet; in water, yellowish brown. *P. c. of empl.*, ¼ to ½.
5. RED SAUNDERS (*syn.*, red santalwood, red sandalwood, santalum rubrum, barwood, camwood). *D. prin.*, Santaline or santalic acid. *Source*, Wood of Pterocarpus santilinus of Africa, East Indies, Ceylon, etc. *Color*, Brownish red. *P. c. of empl.*, 1/10 to 3.
6. SAFFRON. *Source*, Dried stigma and style of Crocus sativus. *Color*, Golden yellow. *P. c. of empl.*, ¼ to ½.
7. CARAMEL (*syn.*, burnt sugar. *Color*, Brown. *P. c. of empl.*, ¼ to ½.
8. CHLOROPHYL (*syn.*, leaf-green, chromule). *D. prin.*, Phyllocyanin and phylloxanthin. *Source*, Grass and leaves of plants and trees. *Color*, Green. *P. c. of empl.*, ¼ to ½.
9. ANILIN RED (*syn.*, roseanilin, rosein, fuchsin, magenta). *Source*, Coal-tar derivative. *Color*, Red. *P. c. of empl.*, 1/6 to ½.
10. ANILIN BLUE (*syn.*, opal blue, gentian blue, Hessian blue, spirit blue). *Source*, Coal-tar derivative. *Color*, Blue. *P. c. of empl.*, 1/6 to ½.
11. METHYL VIOLET (*syn.*, benzyl violet, Paris violet). *Source*, Coal-tar derivative. *Color*, Violet. *P. c. of empl.*, 1/6 to ½.
12. ERYTHROSIN (*syn.*, eosin J, pyrosin B). *Source*, Coal-tar derivative. *Color*, Cherry red. *P. c. of empl.*, 1/6 to ½.
13. CONGO RED. *Source*, Coal-tar derivative. *Color*, Reddish brown. *P. c. of empl.*, ¼ to 1.
14. PRUSSIAN BLUE (*syn.*, Turnbull's blue, Saxon blue, Paris blue, Chinese blue). *Source*, Iron ferrocyanid. *Color*, Blue. *P. c. of empl.*, ¼ to ½.
15. CATECHU (*syn.*, catechu, gambier, cutch). *D. prin.*, Catechin and catechu-tannic acid. *Source*, Dried sap of various species of Acacia or Mimosa, from the East Indies; also from betel-nut. *Color*, Brownish yellow. *P. c. of empl.*, 2 to 10.
16. INDIGO. *Source*, Leaves of Indigoferra tinctoria, growing in Bengal, Java, etc. Also made synthetically. *Color*, Blue. *P. c. of empl.*, 1 to 2.
17. VERMILION (*syn.*, cinnabar, red sulfid of mercury. *Color*, Red. *P. c. of empl.*, ½ to 1.
18. BRAZIL WOOD (*syn.*, redwood, peachwood, sapan-wood. *D. prin.*, Brazilin and brazilein. *Source*, Wood of several species of Cæsalpinia, of Central and South America, Asia, Africa, etc. *Color*, Red. *P. c. of empl.*, ½ to 2.
19. AZO ORANGE R. *Source*, Coal-tar derivative. *Color*, Brownish yellow. *P. c. of empl.*, 1/6 to ½.

20. ALIZARIN. *Source*, Coal-tar derivative, three varieties—Alizarine V 1, Alizarine R G, Alizarine S X. *Color*, Brownish yellow. *P. c. of empl.*, 1/6 to ½.

In addition to the above, such agents as madder, Venetian red, Florentine lake, smalt, red coral, tincture of hempseed, and amber are mentioned by various authorities.

PROPRIETARY COLORED DENTIFRICES.

The following is a partial list of the most prominent proprietary colored dentifrices on the American market, together with the coloring agent used, as far as I have been able to ascertain it. Many other colored preparations with a local reputation are being put on the market by various retail dealers in every section of the country. Letters were addressed to the manufacturers of the preparations mentioned below, asking the name of the coloring agent. Seven failed to reply, nine either refused to give the information or answered ambiguously, while eight replied as indicated below. To the latter I wish to express my thanks.

1. "Glycothymolin" (wash). (Violet red.) Dye-stuff employed—No definite answer. (Tincture of cudbear.)

2. "Carbolic Mouth-wash" (Meade & Baker's). (Reddish brown.) Dye—None; color due to constituents.

3. "Rubyfoam" (wash). (Red.) Dye—Refused to answer. (Probably cudbear.)

4. "Sozodont" (wash). (Yellowish red.) Dye—Refused to answer. (Probably red saunders.)

5. "Phénol Sodique" (wash). (Dark brown.) Dye—None; color due to constituents.

6. "Colgate's Liquid Dentifrice." (Red.) Dye—No definite answer. (Standard commercial color No. 1.)

7. "Oriental Tooth Paste." (Garnet.) Dye—Cochineal.

8. "Mennen's Liquid Dentifrice." (Red.) Dye—Refused to answer.

9. "Woodbury's Dental Cream." (Pink.) Dye—Cochineal.

10. "Lavoris" (wash). (Red.) Dye—No definite answer. No coloring agent mentioned in published formula.

11. "Euthymol Tooth Paste." (Pink.) Dye—Erythrosin.

12. "Lister's Tooth Soap." (Light red.) Dye—Congo red.

13. "Fragrant Dentifrice" (powder). (Pink.) Dye—Cochineal.

14. "Pasteurine Tooth Paste." (Pink.) Dye—Refused to answer. (Probably erythrosin.)

15. "Oraline Tooth Paste." (Pink.) Dye—No reply.

16. Pâte Dentifrice." (Bright red.) Dye—Reply, "Artificial rose."

17. "Arnica Tooth Soap." (Brownish red.) Dye—No reply.

18. "Beauty Tooth Soap." (Light red.) Dye—No reply.

19. "Banzai" (powder). (Pink.) Dye—No reply.

20. "Perfectine" (wash). (Red.) Dye—No reply.

21. "Peroxident" (wash). (Brownish red.) Dye—No reply.

22. "Thycalol" (wash). (Red.) Dye—No reply.

23. "Rexall Tooth-wash." (Deep red.) Dye—Refused to answer.

24. "Saturol." (Violet red.) Dye—None; color due to constituents.

LABORATORY EXPERIMENTS.

(1) *Experiments with Coloring Agents.*

Laboratory experiments were begun with fifteen agents which are either coloring agents *per se* or were thought to have a tendency to produce staining of tooth structure. At the same time a laboratory investigation of the twenty-four colored dentifrices mentioned above was instituted.

Freshly extracted teeth were used in all the laboratory experiments. These teeth were first thoroughly scaled, then scrubbed with soap and water, and polished with pumice on a clean brush-wheel. A longitudinal section was then made with a saw, preserving each half, one for a control and the other for the experiment. The work has required sections of

hundreds of teeth, which were prepared with difficulty, owing to the resistance of the enamel to the saw. The sections were then thoroughly bleached in hydrogen dioxid, and after this, to prevent any possible effects of the dioxid on the preparation to be experimented with, were washed in running filtered water for forty-eight hours.

The tooth-powders, pastes, and soaps were experimented with in saturated watery solutions, this being nearly the percentage in which they are used in the mouth. The water used for experimentation with these dentifrices was ordinary Cincinnati drinking water, as obtained directly from the hydrant.

The experiments with all of the preparations, including the coloring agents, mouth-washes, powders, pastes, and soaps, were begun by placing one-half of the tooth specimen in a test tube containing the preparation, the other half being numbered to correspond, and kept in an envelope for daily comparison with its counterpart.

Agents and solutions employed. For the mouth-wash experiments, watery solutions (filtered hydrant water) of 50, 25, 10, and 5 per cent. strength were made of each preparation to be experimented with. These, as well as the full-strength solution, were placed in test tubes, and the plan already described with reference to the tooth sections was followed.

For the experiments with the coloring matters, solutions either watery or alcoholic, depending on the solubility of the agent, were used of 100, 50, 25, 10, 5, $2\frac{1}{2}$, 1, $\frac{1}{2}$ and 1/10 per cent. strength. The water used in making solutions for the coloring agents was distilled water. Cudbear, alkanet, saffron, chlorophyl, krameria, and wild indigo were obtained from reputable drug supply houses in the form of tinctures or fluid extracts, and alcoholic solutions of these were made. Alkaline solution of carmine was utilized for the experiments with this agent, the weaker solutions being made with distilled water.

Both alcoholic and alkaline watery solutions were experimented with in using hematoxylon. For the watery solution a decoction of hematoxylon was first made, and then colored by the addition of ammonia water. The directions prescribed by the U. S. Pharmacopeia for making decoctions were followed. For the alcoholic solution of this agent a tincture was first made by maceration of the wood and straining through a percolator, according to the usual proceedings prescribed by the U. S. P. for making tinctures.

A tincture was prepared of red saunders after similar methods, and alcoholic solutions were prepared from this. Experiments were also carried on with a decoction which I prepared of this agent, but it was found that the red saunders did not impart its red color to water as it does to alcohol.

Burnt sugar was obtained from a reputable drug house, and watery solutions of various strengths were prepared. A saturated watery solution of chinosol was made and was then filtered for the experiments with this agent, solutions of various strengths being prepared from that. The same plan was followed with roseanilin and methyl violet.

I was unable to make a satisfactory solution of indigo suitable for these experiments. It was utilized as follows: An ordinary emulsion in water was made by adding as much indigo to the water as it would temporarily hold in suspension. This was considered full strength or 100

per cent., and the weaker solutions were prepared from that, the mixture being frequently shaken to prevent settling of the contained indigo. When the teeth were placed in these solutions, the test-tubes were shaken three or four times a day by myself or some of my assistants to stir up the contents.

Tannic acid was experimented with in the form of an emulsion in glycerin, adding as much tannin as the glycerin would hold, by means of a mortar and pestle, and using that for the full-strength experiments, carrying it on to the weaker solutions in glycerin.

The method of making the various percentage solutions used in the experiments with the coloring agents was as follows: Stock solutions were first prepared in full strength, as well as in 50 and 25 per cent. strengths. Then, for making the weaker solutions, either the 50 or the 25 per cent. solution was utilized, carrying this on down to 10 per cent., of which last enough was made not only to be utilized for the experimentation with it, but to have a balance left from which to make the still weaker solutions. This was then carried on down to 5 per cent., and from that the $2\frac{1}{2}$ per cent. solution was made. Then from the $2\frac{1}{2}$ per cent. the 1 per cent. solution was made; from the 1 per cent. the $\frac{1}{2}$ per cent., and from the $\frac{1}{2}$ per cent. the 1/10 per cent. solution. This method, and the use of a cc. graduate measure were calculated to insure exactness. This plan was also followed in making the solutions of the mouth-washes.

The plan already mentioned with reference to the tooth sections was now followed. Each day the section was removed from the test tube, compared with the control, and results were marked on a series of charts which I prepared for the purpose. These charts were prepared with the original intention of continuing the test for thirty days, but marked results were obtained in most instances in ten days, while staining in some cases was noticed in a few hours. At the end of ten days all the sections were removed from the solutions. I have in my possession the teeth which were used in these experiments.

Staining results noted. These charts are self-explanatory. They show that staining was produced by all the coloring agents experimented with, even including the 1/10 per cent. solutions, with the exception of tannic acid. I was surprised to find that staining was in many instances accomplished to an equal or occasionally an even greater extent with the weaker solutions than with those of full strength. According to the table previously given, the coloring agents are used in dentifrices in from about $\frac{1}{4}$ to 5 per cent. strength, depending on the agent used and the shade desired, so that charts Nos. V to IX inclusive nearly cover the whole range.

Some variation in the amount of staining in the solutions of various strengths may be attributed to variations in the character of the tooth structure experimented with, some teeth seeming to stain more readily than others.

Chinosol, tannin, tincture of krameria, and fluid extract of wild indigo are not coloring agents *per se*, but owing to their characteristic color were experimented with in order to learn just what results would be obtained. Chinosol is an antiseptic of the coal-tar class, of a lemon yellow color, and is used in about 1 per cent. strength as a constituent of some mouth-washes on account of its germicidal properties. Discoloration of the enamel, dentin, and cementum was pro-

(I.)

COLORING AGENTS—FULL STRENGTH.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Tinct. cudbear	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5
Alkanet	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+4	+5	+5	+4	+5	+5	+5	+5	+5	+5	+5	+5
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+2	+2	+4	+4	+3	+5	+5	+4	+5	+5	+4	+5	+5	+4	+5	+5
Red saunders	+	+1	+	+	+1	+	+	+1	+1	+	+2	+1	+	+3	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+4	+4	+3	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Wild indigo	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Caramel solution	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2	+1	+3	+3	+1	+3	+3	+1	+3	+3	+2	+3	+3	+2	+3	+3
Chlorophyl	−	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+3	+4	+4	+3	+4	+4	+4	+4	+4	+5	+5	+5
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+2	+1	+	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	±	−	−	±	−	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+4	+3	+1	+4	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4
Chinosol	+	+	+1	+	+	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4	+5	+5	+5

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(II.)

COLORING AGENTS—50 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4
Tinct. cudbear	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4	+4	+5	+5
Alkanet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Red saunders	+	+1	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Wild indigo	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Caramel solution	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+2	+1	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4
Chlorophyl	−	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+1	+1	±	+2	+2	+2	+2	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4
Roseanilin	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+4	+4	+5	+5	+5	+5	+5	+5	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	±	−	−	±	−	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+5	+4	+3	+5	+5
Chinosol	+	+	+1	+	+	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

COLORING AGENTS—25 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+4	+4	+5	+5
Tinct. cudbear	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Alkanet	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4
Hematoxylon	±	+	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+3	+1	+4	+3	+3	+5	+3	+3	+5	+3	+3	+5	+4	+4	+5	+5
Red saunders	+	+1	+	+	+1	+1	+	+2	+2	+	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+4
Tinct. saffron	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Wild indigo	±	+1	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3
Caramel solution	±	+1	+	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4
Chlorophyl	−	+	+	±	+	+	±	+1	+1	±	+1	+1	±	+1	+1	+	+1	+1	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Roseanilin	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+4	+3	+3	+4	+4	+3	+4	+4	+3	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	±	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Chinosol	+	+	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+4	+4	+4	+5	+5	+5

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(IV.)

COLORING AGENTS—10 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+	+	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+5	+5
Tinct. cudbear	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3
Alkanet	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4	+3	+5	+5
Hematoxylon	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+1	+2	+3	+2	+2	+3	+3	+3	+5	+4
Red saunders	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Tinct. saffron	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3
Wild indigo	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	±	+2	+1	±	+2	+1	+	+3	+2	+1	+3	+2	+2	+3	+3
Caramel solution	+	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3
Chlorophyl	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+1	+1	+2	+1	+1	+2	+3	+3	+2	+3	+3	+3	+4	+4
Indigo	±	+	+	±	+	+	±	+	+	±	+	+	±	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+4	+3	+2	+4	+3	+3	+4	+4	+3	+5	+5
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	±	–	±	±
Tinct. krameria	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+4	+3	+2	+4	+3
Chinosol	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+	+2	+2	+1	+3	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

COLORING AGENTS—5 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+	+	+	+2	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+5	+4	+4	+5	+5
Tinct. cudbear	±	+	+	+	+1	+1	+	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4
Alkanet	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Hematoxylon	±	+	+	+	+1	+1	+	+3	+2	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5
Red saunders	−	−	−	−	−	−	−	±	±	±	±	±	±	+	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4
Tinct. saffron	−	±	±	+	±	±	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+4	+3
Wild indigo	−	±	±	−	±	±	±	+	+	±	+	+	±	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+1	+3	+2
Caramel solution	±	+	+	±	+	+	±	+1	+1	+	+2	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+4	+3	+3	+5	+4
Chlorophyl	−	±	±	±	+	+	±	+	+	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4
Indigo	−	−	−	±	±	±	±	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+3	+3	+1	+3	+3
Roseanilin	+	+1	+1	+	+1	+1	+1	+3	+2	+2	+3	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Methyl violet	+	+1	+1	+	+1	+1	+1	+3	+2	+2	+3	+2	+2	+4	+3	+3	+4	+4	+3	+5	+4	+3	+5	+5	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	±	+	+	±	+	+	+	+2	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4
Chinosol	−	±	±	−	±	±	±	+1	+	±	+2	+2	±	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(VI.)

COLORING AGENTS—2½ PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	−	±	±	±	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+4	+3	+5	+5	+3	+5	+5
Tinct. cudbear	−	±	±	±	+	+	+	+1	+	+1	+2	+1	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+4	+4	+4	+4	+4	+4
Alkanet	−	±	±	±	+	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4	+4
Hematoxylon	−	−	−	−	±	±	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+3	+3	+4	+4
Red saunders	−	−	−	−	±	−	±	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4
Tinct. saffron	−	−	−	−	±	+	±	+1	+1	±	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+	+2	+2	+1	+2	+2	+1	+2	+2
Wild indigo	−	−	−	−	±	−	±	+1	+	±	+1	+	+	+2	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3
Caramel solution	−	−	−	−	±	−	±	+1	+1	±	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3
Chlorophyl	−	±	±	±	+	+	±	+2	+2	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4
Indigo	−	±	±	±	+1	+	±	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	+	+1	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4
Methyl violet	+	+1	+1	+1	+3	+2	+1	+3	+2	+2	+4	+3	+2	+4	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	−	±	−	−	±	±	±	+	+	±	+1	+1	+	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+3	+4	+3
Chinosol	−	±	±	−	±	±	+1	+2	+2	+2	+2	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

COLORING AGENTS—1 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	±	±	±	+1	+1	+1	+3	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5	+4	+5	+5
Tinct. cudbear	±	±	−	±	±	±	+	+1	+1	+1	+2	+1	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+4	+3	+3	+4	+3
Alkanet	±	±	±	±	+	+	+1	+2	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+3
Hematoxylon	−	−	−	−	±	±	+	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3
Red saunders	−	−	−	−	−	−	±	+	+	±	+	+	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3
Tint. saffron	−	−	−	−	±	−	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2
Wild indigo	−	−	−	−	−	−	±	+	+	±	+1	+	+	+2	+1	+	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+3	+2
Caramel solution	−	−	−	−	−	−	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Chlorophyl	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3
Indigo	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	+	+1	+1	+1	+3	+2	+1	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+4	+4
Methyl violet	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+5	+5	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	−	±	−	−	±	±	±	+1	+	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3
Chinosol	−	±	−	−	±	±	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(VIII.)

COLORING AGENTS—ONE-HALF PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4
Tinct. cudbear	±	+1	+1	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4
Alkanet	+1	+1	+1	+1	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+4	+4	+4	+4	+4	+5	+4	+4	+5	+4	+4	+5	+5
Hematoxylon	±	±	±	±	+1	+	+	+1	+	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+5
Red saunders	−	±	±	±	+1	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4	+4	+5	+5
Tinct. saffron	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±	±	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2
Wild indigo	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3
Caramel solution	±	±	±	+	+1	+	+	+1	+	+	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Chlorophyl	±	±	±	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Indigo	−	−	±	±	+	+	+	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Roseanilin	±	+1	+1	+	+1	+1	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Methyl violet	+1	+3	+2	+1	+3	+2	+2	+4	+3	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+4	+4	+4	+4	+5	+5
Tannic acid	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Tinct. krameria	±	±	±	+	+	+	+1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4	+4	+4	+4
Chinosol	+1	±	+1	+2	+1	+1	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+2	+2

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

COLORING AGENTS—ONE-TENTH PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Carmine	±	±	+1	+	+2	+	+	+2	+1	+1	+2	+1	+1	+3	+2	+2	+3	+2	+2	+3	+2	+2	+3	+3	+2	+4	+3	+3	+4	+3
Tinct. cudbear	–	–	+1	–	+	+1	±	+1	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+3	+2
Alkanet	–	±	–	–	+1	+	±	+1	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Hematoxylon	±	±	±	+	+	±	+	+	±	+1	+2	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3
Red saunders	–	±	+	±	+	+	+1	+1	+	+2	+3	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4
Tinct. saffron	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2
Wild indigo	–	–	–	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3
Caramel solution	±	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Chlorophyl	–	+1	+1	±	+1	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+2	+3	+2	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+4	+4
Indigo	±	±	±	+	+	+	+	+	+	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Roseanilin	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Methyl violet	+1	+1	+1	+1	+2	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+3	+4	+4	+3	+4	+4
Tannic acid	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tinct. krameria	–	–	–	±	+	+	±	+1	+	+	+1	+1	+1	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2
Chinosol	±	±	±	+	+	+	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

duced in one day by a 1/10 per cent. solution of this agent. It will be noticed that no discoloration was observed with tannic acid in the percentage solutions in which it is being used in mouth-washes. At the same time there is a possibility of its producing discoloration in the mouth through its union with blood or other substances containing iron, with the production of iron tannate. Staining of the enamel was produced in two days with tincture of krameria in 1/10 per cent. solution. There is also a possibility of the production of iron tannate with this agent and others of similar nature, such as catechu, kino, etc., through the same reaction as mentioned before in connection with tannic acid, all of these depending on the presence of tannin for their astringent properties. Fluid extract of wild indigo, not primarily a staining agent, but an astringent, produced discoloration of enamel in a 1/10 per cent. solution in two days. The cementum in most instances was found to be most susceptible to the stains, the dentin less so, and the enamel least. In quite a number of cases, however, the dentin seems to take the stain more rapidly and perceptibly than the cementum. In a few of the sections used, a piece of the alveolar process was left still adhering, and in these it was found that the bony tissue was most susceptible of all to staining.

Another significant fact observed was that the neck of the tooth, just at the junction of the enamel and dentin, where recession of the gums begins in the mouth, was the most readily and quickly stained of any portion of the tooth. Roughened enamel surfaces, cracks in the enamel, pits and fissures, where the enamel is known to be frequently imperfect, cavities of decay, abraded and eroded surfaces, and the margins of fillings were noticeably subject to staining, these areas always staining more readily and to a greater extent.

The U. S. Department of Agriculture's Board of Food and Drug Inspection, in its food inspection decision No. 76—"Dyes, chemicals, and preservatives in foods"(1)—publishes a list of seven coal-tar dyes which it recommends as being harmless and allowable for coloring foods under the pure foods and drugs law. The list is as follows:

Red shades—107, Amaranth. 56, Ponceau 3R. 517, Erythrosin.
Orange shade—85, Orange 1.
Yellow shade—4, Naphthol yellow S.
Green shade—435, Light green S F, yellowish.
Blue shade—692, Indigo disulfo-acid.

Specimens of 107, 517, 85, 4, and 435 were obtained, and discoloration of the enamel, dentin, and cementum was noticed at the end of twenty-four hours' immersion in 1/10 per cent. solutions of these agents.

Experiments which will be mentioned later proved that the stains produced by these dyes are penetrating stains, practically unaffected by sunlight or continued washing. Erythrosin and probably one or two others of these dyes are being used as coloring agents in dentifrices.

(2) *Experiments with Mouth-washes.*

The mouth-washes already mentioned were experimented with in full strength, and in 50, 25, 10, and 5 per cent. solutions. The method of preparing these solutions has already been described, and the same method employed in staining the tooth sections as already mentioned was followed.

Kolynos was used as a kind of control, it being a typical wash of the colorless class, its color being a milky white. I

(X.)

MOUTH-WASHES—FULL STRENGTH.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	−	±	±	±	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+3	+2	+1	+3	+3	+1	+3	+3	+2	+3	+3
Glycothymolin	−	±	±	−	+1	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Phénol Sodique	−	±	±	±	+1	+	±	+2	+1	+	+2	+2	+	+2	+2	+1	+3	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Rubyfoam	−	±	±	±	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Perfectine	−	−	−	−	±	−	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2
Meade & Baker's Carbolic Mouth-wash	−	±	±	−	+	+	±	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4
Colgate's Liq. Dentifrice	−	−	−	−	±	±	±	+	+	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3
Peroxident	−	+	+	±	+4	+4	+	+4	+4	+1	+4	+4	+2	+4	+4	+2	+4	+4	+2	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Thycalol	−	±	±	±	+	+1	+	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Mennen's Liq. Dentifrice	−	±	−	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	±	+	±	+	+	+	+1	+1	+1
Lavoris	−	±	±	±	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+3	+3	+3	+4	+4	+4	+4	+4	+4	+4	+4	+4
Rexall Tooth-wash	−	−	−	−	+	+	−	+	+	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	−	−	−	±	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Kolynos	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XI.)

MOUTH-WASHES—50 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Glycothymolin	±	+	+	+	+1	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+2	+3	+3	+3
Phénol Sodique	±	+	+	+	+	+	+	+1	+	+1	+2	+1	+1	+3	+1	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+4	+4	+3	+4	+4
Rubyfoam	–	±	±	±	+	+	±	+	+	±	+1	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3
Perfectine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	±	±	±	±	+	+	+
Meade & Baker's Carbolic Mouth-wash	–	±	±	±	+	+	+	+1	+1	+	+2	+2	+1	+2	+2	+2	+3	+2	+2	+3	+3	+3	+3	+3	+3	+3	+4	+4	+4	+4
Colgate's Liq. Dentifrice	–	±	±	–	±	±	–	±	±	–	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1
Peroxident	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+2	+4	+3	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+4	+4	+3	+5	+5
Thycalol	–	+1	+	±	+1	+	+	+1	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+4
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mennen's Liq. Dentifrice	–	–	–	–	±	+	±	+	+	±	+	+	±	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2
Lavoris	–	+	+	+	+1	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3
Rexall Tooth-wash	–	–	–	–	±	–	±	+	+	±	+1	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+3	+3	+3
Saturol	±	±	±	±	±	±	±	±	±	±	±	±	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+3	+3
Sozodont	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+3	+3

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

MOUTH-WASHES—25 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Glycothymolin	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2
Phénol Sodique	–	±	±	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3
Rubyfoam	–	±	±	–	±	±	±	+	+	±	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3
Perfectine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Meade & Baker's Carbolic Mouth-wash	±	+	+	+	+1	+1	+1	+1	+1	+2	+2	+2	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+3	+4	+3	+4	+4	+4
Colgate's Liq. Dentifrice	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2	+1	+2	+2
Peroxident	±	+	+	+	+1	+	+1	+2	+2	+1	+2	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Thycalol	–	+	+	–	+1	+1	±	+1	+1	+	+2	+2	+	+2	+2	+1	+3	+2	+1	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mennen's Liq. Dentifrice	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	±	±
Lavoris	–	±	–	±	+	+	±	+	+	±	+1	+1	±	+2	+1	+	+2	+1	+1	+2	+2	+1	+3	+2	+1	+3	+2	+1	+3	+2
Rexall Tooth-wash	–	–	–	–	±	–	±	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	–	–	–	–	±	±	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2
Sozodont	–	–	–	–	±	–	–	±	±	–	+	+	–	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

(XIII.)

MOUTH-WASHES—10 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	−	−	−	−	±	−	±	+	+	+	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Glycothymolin	−	−	−	−	±	±	−	±	±	±	+1	+1	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1
Phénol Sodique	−	−	−	±	+	+	±	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2
Rubyfoam	−	±	±	±	+1	+1	+	+1	+1	+	+2	+1	+1	+2	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+3
Perfectine	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Meade & Baker's Carbolic Mouth-wash	−	±	−	±	+1	+	+	+1	+1	+1	+2	+	+1	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Colgate's Liq. Dentifrice	−	−	−	−	±	−	−	±	±	−	±	±	−	+	±	±	+	+	+	+1	+	+	+1	+1	+	+1	+1	+	+1	+1
Peroxident	±	±	±	±	+	+	+	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3
Thycalol	−	±	±	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+1	+3	+3	+1	+3	+3	+2	+3	+3	+2	+3	+3
Kolynos	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Mennen's Liq. Dentifrice	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	±	+	+	±	+	+	+	+	+	+	+	+	+	+	+
Lavoris	−	−	−	−	±	−	±	+	+	±	+	+	+	+1	+1	+1	+2	+1	+1	+2	+1	+1	+2	+2	+1	+2	+2	+1	+2	+2
Rexall Tooth-wash	−	−	−	−	−	−	±	+	+	±	+	+	±	+1	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	−	−	−	−	±	−	±	±	±	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

MOUTH-WASHES—5 PER CENT. SOLUTION.

DAYS	1			2			3			4			5			6			7			8			9			10		
Structure affected...	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Sozodont	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	+	+	+	+	+	+	+	+	+	+1	+1	+1	+1	+1
Glycothymolin	–	–	–	–	–	–	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1
Phénol Sodique	–	–	–	–	–	–	–	±	±	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+1	+2	+2	+2
Rubyfoam	–	–	–	–	–	–	–	±	±	+	+1	+1	+	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3
Perfectine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	±	+	+	±	+	+	+	+	+	+	+1	+1	+1	+1	+1
Meade & Baker's Carbolic Mouth-wash	–	–	–	–	±	±	–	+	±	±	+	+	+	+1	+1	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+3	+3
Colgate's Liq. Dentifrice	–	–	–	–	–	–	–	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+2	+2	+1	+2	+2	+2	+2	+2	+2	+2	+2
Peroxident	–	–	–	–	–	±	–	–	±	–	±	±	–	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2
Thycalol	–	–	–	–	±	±	±	+1	+	+	+2	+1	+	+2	+2	+2	+3	+3	+2	+3	+3	+2	+3	+3	+2	+3	+3	+3	+3	+3
Kolynos	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mennen's Liq. Dentifrice	–	–	–	–	–	–	–	±	–	±	+	+	±	+	+	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+2	+1	+1
Lavoris	–	–	–	–	–	–	–	±	±	–	±	±	–	±	±	+	+1	+1	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Rexall Tooth-wash	–	–	–	–	–	–	–	–	–	±	+	+	±	+	+	+	+1	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
Saturol	–	–	–	–	–	–	±	±	±	+	+	+	+	+	+	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+2	+2	+2	+2	+2

KEY TO SIGNS: – no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

was anxious to see just what results would be obtained. The charts show that in no instance did it produce discoloration. It will also be observed that some of the preparations exhibited quite a variation in the amount of discoloration produced in solutions of different strengths of the same agent. This is undoubtedly largely due to a difference in the character of the teeth experimented with.

Peroxident, Meade & Baker's Carbolic Mouth-wash, and Phénol Sodique, none of which (according to published formulæ) contain artificial coloring matters, and Lavoris and Thycalol, both of which are artificially colored, seemed to produce the greatest amount of discoloration. Mennen's Liquid Dentifrice, Rexall, and Colgate's Liquid Dentifrice caused the least staining, while the others seemed to occupy a medium ground. I was surprised at the somewhat negative results obtained with the Mennen preparation, after I had observed that a reddish deposit was present on the inside of the original bottle after its contents were removed, which was still noticeable after five minutes' washing with water. I was also startled by the great amount of staining produced by Peroxident, in view of the fact that it contains 20 per cent. of hydrogen dioxid, a bleaching agent. The marked staining produced by this agent, as well as by Meade & Baker's Carbolic Mouth-wash, neither of which are colored artificially, suggests the possibility that many drugs now incorporated in mouth-washes, although they are not primarily coloring agents, may produce harmful results through their staining property.

As will be seen from a study of the charts, staining of the dentin and cementum was produced in some instances by a 5 per cent. solution in two days (Thycalol and Meade & Baker's), while staining of the enamel with a solution of the same strength required three days (Thycalol and Saturol). Staining of the enamel was accomplished in one day by several others of the preparations in solutions of higher strength.

The significant fact mentioned before in connection with the coloring agents was also apparent in the experiments with the mouth-washes, viz, discoloration was produced in a number of instances more slowly but to a greater extent with the weaker solutions than with the strong ones.

Dr. A. E. Osmond, hematologist of the Cincinnati City Hospital and professor of histology and bacteriology in the Ohio College of Dental Surgery, to whom I am indebted for valuable assistance in this work, informs me that this is a fact which is well known to hematologists with reference to staining blood cells for microscopical examination, and that much better results are obtained in their work by the use of the weaker solutions of the staining agents which they employ.

As will be observed, discoloration of enamel, dentin, and cementum was accomplished with all of the preparations of this class experimented with. Maximum results were obtained with Pâte Dentifrice, a French preparation, Oriental Tooth Paste, an English product, Banzai, a supposedly Japanese powder of a deep pink color, and Euthymol Tooth Paste, an American dentifrice. The least results were obtained with Oraline Tooth Paste and Woodbury's Dental Cream, Oraline producing very little discoloration of enamel, regardless of the fact that a saturated solution of it shows a brownish red color. I have been unable to discover what coloring

SATURATED SOLUTIONS: TOOTH POWDERS—PASTES—SOAPS.

DAYS	1			2			3			4			5			6			7			8			9			10		
Tissue affected.....	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C	E	D	C
Oraline Paste	−	±	±	−	±	±	−	+	±	−	+	±	−	+	±	−	+	+	−	+	+	±	+	+	±	+	+	±	+	+
Pasteurine Tooth Paste	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+	+	+1	+	+1	+2	+2	+2	+3	+3	+2	+3	+3
Euthymol Tooth Paste..	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4	+3	+4	+4
Woodbury's Dent. Cream	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±	−	±	±	±	+	+	+	+1	+1	+	+1	+1	+	+1	+1
Oriental Tooth Paste ..	±	+	+	±	+	+	±	+	+	±	+	+	±	+	+	+	+1	+	+1	+2	+2	+2	+3	+3	+3	+4	+4	+4	+5	+5
Pâte Dentifrice (R.&G.)	+	+1	+1	+	+1	+1	+	+1	+1	+	+1	+1	+1	+2	+1	+1	+2	+1	+2	+3	+3	+3	+4	+4	+4	+5	+5	+4	+5	+5
Arnica Tooth Soap	−	±	±	−	+	+	−	+	+	±	+	+	±	+	+	+	+1	+	+1	+2	+2	+1	+3	+3	+2	+3	+3	+2	+4	+4
Lister's Tooth Soap	−	±	±	−	+	±	−	+	±	−	+	±	−	+	±	−	+	+	−	+1	+1	±	+2	+1	±	+2	+1	±	+2	+2
Beauty Tooth Soap	−	+	+	−	+	+	−	+	+	−	+	+	−	+	+	±	+1	+	+	+2	+1	+	+2	+2	+1	+2	+2	+2	+3	+3
Fragrant Tooth Powder	−	+	+	−	+	+	−	+	+	±	+	+	±	+	+	+	+1	+1	+	+2	+1	+1	+2	+2	+2	+3	+3	+3	+4	+4
Banzai (Powder)	±	+	+	±	+	+	+	+	+	+	+1	+1	+	+1	+1	+	+2	+1	+	+2	+2	+1	+3	+3	+3	+5	+5	+4	+5	+5

KEY TO SIGNS: − no result. ± very slight. + slight. +1 medium. +2 marked. +3 well marked. +4 very marked. +5 excessive.
E, enamel. D, dentin. C, cementum.

agent is used in its manufacture, but whatever it is, it seems to stain least of any of the colored preparations I have experimented with.

(3) *Amount of Penetration and Action of Sunlight and Water on Stains.*

In order to test the permanence of the stains, a large number of whole teeth were immersed for ten days in many of the dyes (including those recommended in F. I. D. No. 76), also in a majority of the dentifrices. These were then exposed to the rays of the sun for seven successive days. Very little if any bleaching was apparent at the end of that time; in fact, the color in some instances seemed to be more fixed and deeper.

Whole teeth were then immersed in a large number of the solutions (both dyes and dentifrices being tested) for ten days, and then transverse sections made to observe the amount of penetration of the discoloration. Sections were made through the center of the crowns and roots. These evidenced the fact that the stain had penetrated the enamel, dentin, and cementum for quite a distance in each instance—in fact, some of the preparations had stained the tooth through and through.

Teeth which had been subjected to the action of many of the dentifrices and coloring matters for a week were then continuously washed in running filtered water for forty-eight hours, and at the end of that time no apparent change was noticeable.

(4) *Saliva Experiments.*

In addition to experimentation with watery solutions of the dentifrices, solutions in saliva of a number of them were also utilized. Practically the same results were obtained with these solutions, staining occurring in every instance, the saliva seeming not to modify in the least the results already obtained.

EXPERIMENTS AND OBSERVATIONS IN THE MOUTH.

The above laboratory experiments have conclusively proved that not only dentin, cementum, and bone, but enamel, is readily stained out of the mouth—staining of enamel tissue having been accomplished in every instance in which a colored preparation was employed. These stains, as has been demonstrated, were not superficial but penetrating stains, non-responsive to sunlight or continual washing. Staining of these tissues occurs also in the mouth from various causes in cases in which the enamel and dentin have lost their vitality through removal of the pulp, also in cases of vital teeth. In cases of staining from putrefactive decomposition of the pulp the stain will frequently permeate from within throughout the substance of the dentin, and, reaching the enamel cap, will permeate that tissue and stain it through and through.

In order to prove that the enamel itself was stained, and that the discoloration was not simply due to an array of colors in the underlying dentin, I examined freshly extracted teeth with perfect enamel caps, or as nearly perfect as nature usually makes them, in which the pulps had lost their vitality, and which were badly discolored through the process of putrefactive pulp decomposition. After amputating the crown with a saw, I drilled out all the crown portion of the dentin, leaving the enamel intact, and found the discoloration still present in the enamel tissue.

Stains do not penetrate the enamel as quickly as the other tooth tissues, on account of its greater density, its histo-

logical structure not presenting the avenues of entrance that are found in dentin, cementum, and bone. In addition to this, the enamel is largely composed of inorganic matter for which many coloring agents have very little chemical affinity. Nevertheless these stains do attack the enamel, as has already been proved in my laboratory experiments made out of the mouth; besides which, the experiments just mentioned prove that enamel is susceptible to the penetration of stains in the mouth.

Tobacco stains. In the instance just mentioned the enamel was dead enamel, offering no vital resistance against the entrance of the stain. But vital enamel will take stains, as evidenced in the case of tobacco-chewers. Who has not seen deep staining of enamel caps in these cases? I have made sections of enamel stained with tobacco, and have found it deeply discolored. Again, I have observed cases in which, after patients had chewed tobacco for years, with the resultant staining, on discontinuance of the habit and institution of strict oral hygienic conditions with regular brushing of the teeth, gradually the stains would almost disappear, though not entirely, from vital teeth, while they remained (to a large extent permanently) on any teeth which had lost their vitality.

D. D. Smith(1) claims that the color of teeth becomes lighter and more brilliant from the constant burnishing incident to his methods of oral prophylaxis, and believes this to be due to the stimulation of some sort of modified circulatory apparatus, the function of which enables the tooth to absorb as well as throw off stains present in its substance. This would certainly appear to be the case in the instance of the tobacco stains just mentioned, and would account for the accumulation and disappearance of other transient stains occasionally found.

If stains can be carried throughout the substance of a tooth by absorption from the inside, as is seen in putrefactive processes originating in the pulp, there is no valid reason why they cannot as well be carried inward from the outside. In fact we have abundant proof of this, as evidenced in the case of tobacco-chewers already mentioned, as well as in other instances of the same phenomenon. C. H. Land has mentioned the fact that persons who constantly chew cloves have their teeth stained throughout with a brown color. Burchard(2) and other writers, some of whom have already been cited, have called attention to the fact that deep staining of the enamel and other tooth tissues may be produced from without or from within by such agents as copper, brass, iron, mercury, silver, nickel, etc. The staining of enamel by chewing the betel-nut, as already cited, offers additional proof.

Metallic stains. A case of green stain in the mouth of a patient who works in a brass foundry, and who came under my observation some weeks ago, revealed the fact that vital enamel will absorb copper stain. A vital tooth, much misplaced in the arch, and with perfect enamel cap, was extracted and dissected transversely in the center of the crown, when it was noticed that a slight greenish tinge was present in both enamel and dentin, after the tooth had been thoroughly cleaned.

Thus it is proved that macroscopically apparently perfect enamel caps will transmit stains originating either from without or within, throughout their substance. But very few perfect enamel caps are found in any mouth. Extrane-

ous stains in the majority of instances find an excellent gateway of entrance through roughened enamel surfaces, cracks in the enamel, abraded and eroded surfaces, cavities of decay, exposed cemental surfaces at the necks of teeth, and pits and fissures, where frequently an imperfect coalescence of enamel plates exists.

If these tissues, then, will discolor in the mouth from the causes already mentioned, there is no valid reason why they should not take practically any staining agent brought constantly in contact with them.

Food stains. Foods, during the act of mastication, are being brought daily into contact with exposed or practically exposed dentinal and cemental surfaces. Many of these foods are naturally colored, while others are artificially colored by the manufacturers. In addition, in unclean mouths, the processes of fermentative and putrefactive decomposition are constantly in progress, with the consequent production of sulfids, oxids, and other salts which have a tendency to discolor the dental tissues.

Senile teeth are of a darker hue than the teeth in adolescence. This is believed to be due to an increase in density of the teeth with age: James Truman(1). It is also, in my opinion, due to the absorption of extraneous coloring matters with which these teeth are daily coming in contact, as well as the deposition of pigmentary matters from within, by way of the pulp.

Staining agents in the mouth produce a change in the color of a tooth in two ways, depending upon their solubility or insolubility. Solutions stain the cementing substance uniting the tubules, while insoluble colors enter the tubules and remain, preventing the transmission of light, and thus darkening the tooth structure: Buckley(4).

CORROBORATIVE EVIDENCE OF DISCOLORATION OF DENTAL TISSUES FROM COLORED DENTIFRICES.

As evidence of the staining properties of colored dentifrices I wish to present the following facts which have come under my observation during the time that I have been investigating this subject. I expect before the next meeting of this association to be able to present for the consideration of the dental profession a much more extended report of clinical evidence bearing out my laboratory experiments and the few oral tests which have been completed up to this time. With reference to the oral tests, I must confess that the color question is so unmeasurable, so intangible, that I have been at some loss to devise means or methods of experimentally producing and detecting discoloration in the mouth. An entire denture may be changed in color to quite an extent without the change being apparent to anyone but a very close observer, as would happen by the use of a colored mouth-wash for instance, because all the teeth are subject to the action of the agent at the same time; whereas, if only one or two teeth are discolored from some cause, the change is much more noticeable.

(1) Dr. H. T. Smith of Cincinnati has had numerous patients complain that a well-known wash, which he had been prescribing, produced discoloration of their teeth. He has been compelled to abandon this preparation on that account.

(2) Dr. H. E. Friesell of Pittsburgh, in a private communication, informs me

that he has noticed discoloration of cementum, when it was exposed, from colored tooth preparations.

(3) Dr. C. M. Wright of Cincinnati has been in the habit of prescribing a popular colored mouth-wash, but was forced to abandon it on account of a number of patients complaining that it was discoloring their teeth.

(4) Dr. Flora N. Haag of Cincinnati has noticed discoloration of tooth structure in the mouths of her patients from the use of a well-known colored dentifrice.

(5) As mentioned earlier in this paper, I have had many complaints on the same score from patients, some of them extending back for quite a number of years. The following case is significant:

(6) Mrs. H. K. F., formerly a patient in my private practice, was prescribed the frequent use of a markedly colored proprietary mouth-wash during the treatment of the pyorrhea alveolaris from which she was suffering. The day before she left for England, where she was to make an extended visit, she was told to use the preparation five or six times a day until her return, when she was to consult me again. On her return several months afterward she informed me that she had been compelled to abandon the preparation on the advice of an English dentist, whom she had consulted abroad, because she found that it was causing her teeth to turn dark.

(7) Mr. J. B. H., on examination of his mouth, exhibited a greenish brown stain affecting most of his teeth; the stain was especially apparent on the gingival two-thirds of the crowns. He did not use a tooth-brush, powder, paste, or soap, but occasionally rubbed his teeth with a soft cloth. He also rinsed his mouth daily with a colored mouth-wash, because he was told that it would keep the tartar from accumulating so rapidly. His teeth were thoroughly scaled and polished by means of brush wheels and pumice mixed with hydrogen dioxid, but it was impossible to remove all of the stain at his last visit.

EXPERIMENTS IN STAINING TEETH IN THE MOUTH.

Transient staining of enamel surfaces in the mouth has been produced by means of the following experiments conducted during the past few weeks.

No. 1. A gold cap, into the distal side of which was soldered a metal tube, was made to fit loosely over a perfect upper left lateral incisor in my own mouth. This could be worn with a fair degree of comfort owing to the character of the occlusion. The cap was placed in position, being sealed at the gingival border with gutta-percha. Twice daily a colored mouth-wash was injected through the tubular opening, the orifice of which was then sealed with gutta-percha. The experiment was abandoned after several days' trial, because it was found that leakage was occurring at the gum line, and it was impossible to keep the wash in constant contact with the tooth. The results, thus, were negative.

No. 2. Another cap was made for the same tooth, without the tubular opening, and was several times a day filled with a colored tooth paste; the cap was occasionally removed to moisten the paste and to ascertain that it was remaining in contact with the tooth. This cap was worn at frequent intervals for a week. After the cap had been removed and the tooth thoroughly brushed, at the end of fourteen hours, a slight discoloration of the entire enamel cap was observed. This stain disappeared at the end of two or three hours on leaving off the cap, but was apparent again after replacing the cap and keeping the paste in contact with the tooth till the following day. Three colored pastes were experimented with, two of which produced staining, the other not having any apparent effect. I found that I could produce slight superficial staining of the enamel at will with these two preparations, the stain

in each instance disappearing gradually at the end of two or three hours on leaving off the cap. The results, thus, were positive.

No. 3. The teeth on one side of the mouth were brushed for a period of fifteen minutes at a time, eight times a day for two days, with a colored tooth paste of English manufacture, an effort being made to keep the paste away from the opposite side by tilting the head toward the side that was being brushed. At the end of this time the soft tissues of the mouth and lips presented the appearance of having been rouged, they being markedly stained by the preparation used. All the teeth on one side of the mouth presented a slight pinkish tinge—this gradually disappearing after the experiment was abandoned, which was done on account of soreness of the gums incident to the continual brushing and the danger of producing permanent injury. The results, thus, were positive.

CONCLUSIONS.

(1) That extracted teeth are susceptible to staining by practically all of the coloring agents or dyes which are being used by the manufacturers for coloring dentifrices has been proved by my laboratory experiments.

(2) Staining of enamel, dentin, and cementum has been produced in the laboratory experiments on extracted teeth with a majority of the artificially colored dentifrices on the American market.

(3) Staining of these tissues has also been produced in the laboratory by several colored dentifrices which are not artificially colored, but which owe their color to one or more ingredients which possess color.

(4) These stains are penetrating stains, which are practically unaffected by sunlight or continued washing.

(5) Vital teeth in the mouth are responsive to staining by colored tooth pastes, as has been proved by experimentation in the mouth.

(6) In numerous instances patients have complained of the discoloring properties of some of the colored proprietary dentifrices.

(7) In the clinical cases presented, the history and every other feature lead to the inference that the stains were undoubtedly produced by colored dentifrices.

(8) Stains formed by putrefactive decomposition of the pulp will penetrate *from within outward,* and produce discoloration of the entire enamel cap, as proved by the experiments already mentioned.

(9) Stains from nickel, lead, copper, brass, silver, mercuric chlorid, potassium permanganate, oil of cassia, oil of cloves, and other similar agents will produce discoloration when acting from within *or on the outer surface* of a tooth, these agents staining enamel, dentin, or cementum, as has been mentioned by various authorities.

(10) Copper stain has been proved to be penetrating—having, in the case mentioned, penetrated enamel and dentin.

(11) Enamel, dentin, and cementum, as is well known, readily take stains from tobacco, cloves, and the betel-nut, the tobacco stain being a deeply penetrating stain, as has been proved.

(12) Non-vital teeth stain much more readily than vital teeth, and non-vital teeth are frequently found in the mouths of patients.

(13) Vital or non-vital dentin and cementum, whenever exposed, readily *take almost any stain with which they come in contact,* as they are found discolored in practically every instance in which they have been exposed for any length of time.

(14) Cracks in the enamel, abraded and eroded surfaces, cavities of decay,

and other similar conditions already mentioned, offer excellent avenues of entrance for stains of every character.

(15) Teeth darken with age, and as they will be discolored both in the mouth and out of the mouth by any one from the large list of agents that have been mentioned, there is no valid reason why they will not, in time, absorb practically any colored pigment, *including colored dentifrices* with which they are constantly brought in contact. This being the case, there is a strong possibility of this cause being largely responsible for the darkening of the teeth with age.

Considering the clinical evidence adduced, the laboratory and oral experiments performed, and the seemingly altogether reasonable deductions made, I am forced to the logical conclusion that—

Colored dentifrices constantly used in the mouth will produce staining of tooth structure, and for that reason should be abandoned in favor of colorless preparations.

Bibliography.

Boak, S. D. *Dental Summary*, vol. xxvi, p. 330.

Buckley, J. P. (1) "Text-book of Operative Dentistry," Johnson, 2d edit., p. 324. (2) P. 331. (3) Pp. 369–77. (4) P. 369.

Burchard, H. H. (1) "Dental Pathology and Therapeutics," 3d edit. (Inglis), pp. 269–300. (2) *Ibid.*

Dental Cosmos. (1) Vol. xliv, p. 300. (2) Vol. xlviii, p. 952. (3) "Blackened Teeth from Tea," vol. xii, p. 161. (4) "Mouth-washes," vol. xlv, p. 583.

Kirk, E. C. (1) "American Text-book of Operative Dentistry," 3d edit., pp. 523–48. (2) "Text-book of Operative Dentistry," Johnson, 2d edit., p. 370.

Schultz and Julius. "Organic Coloring Matters" (A. G. Green's edit.).

Smith, D. D. "Oral Prophylaxis," vol. iii, p. 347.

Truman, Jas. "American System of Dentistry," vol. ii, 1st edit., p. 294.

U. S. Dep't of Agriculture. "Food Inspection Decision No. 76," p. 2.

Other authors consulted.

Atkinson, W. H. "Bleaching Teeth," *Dental Cosmos*, vol. vi, p. 597.

Attfield, Jno. "Chemistry," 14th edit.

Black, G. V. "Operative Dentistry," 1st edit.

British Medical Association. "Secret Remedies."

Brookes, C. "Molecular Assimilation of Coloring Matters," *Dental Cosmos*, vol. vi, p. 184.

Buckley, J. P. "Modern Materia Med., Pharm., and Therap.," 2d edit.

Butler, G. F. "Materia Med., Pharm., and Therap.," 6th edit.

Cooley, A. J. "Cyclopedia of Practical Receipts," 7th edit.

Dental Brief. "Potassium Permanganate as a Mouth-wash," vol. xiv, p. 652.

Dental Register. "Pink-stained Teeth," vol. lvi, p. 157. "Silver Stains," vol. lx, p. 206.

Fay, Irving W. "Chemistry of the Coal-tar Dyes."

Fitch, C. P. "Discoloration of Teeth," *Dental Cosmos*, vol. iii, p. 234.

Fothergill, J. A. "Pink Spots on Teeth," *Dental Digest*, vol. vi, p. 594.

Gorgas, F. J. S. "Dental Medicine," 8th edit.

Hagers. "Handbuch der Pharmaceutischen Praxis."

Hahn, Edward und Holfert, Dr. J. "Specialitäten und Geheimmittel mit Angabe ihrer Zusammensetzung."

Hipes and Fisher. "Druggists' Art of Manufactory."

Hiss and Ebert. "Pharmaceutical Preparations," vol. i.

Humphrey, Jno. "*Pharmaceutical Journal* Formulary," 1907 edit.

Johnson, C. N., "Text-book of Operative Dentistry," 2d edit.

Litch, W. F. "American System of Dentistry," 1st edit.

Long, E. H. "Dental Materia Medica and Therapeutics," 2d edit.

Miller, W. D. "On Certain Preparations of Jaws and Teeth," *Dental Cosmos*, vol. xliii, p. 1109.

Morris, J. P. "Essentials of Materia Med. and Therap."

Nelson, H. J. "Druggists' Handbook of Private Formulas."

Oleson, C. W. "Secret Nostrums and Systems of Medicine," 10th edit.

Pharmaceutical Era. "*Era* Formulary."

Potter, S. O. L. "Materia Med. and Therap." 5th edit.

Prinz, Hermann. "Dental Materia Med. and Therap., 1st edit. Also, "Dental Formulary."

René Cerbelard. "Formulaire de Parfumerie et de Pharmacie."

Stevens, A. A. "Modern Materia Med. and Therap.," 2d edit.

U. S. Pharmacopeia.

Wieth, Dr. Théodore. "Formulaire de la Faculté de Médecine de Vienne."

Wittstein, Dr. G. C. "Taschenbuch der Geheimmittellehre."

Discussion.

Dr. J. S. Cassidy, Covington, Ky. In discussing Dr. McGehee's timely and very instructive paper, we should notice that he does not deal with the effects of dead pulps on the color of the teeth, or the stains caused by tobacco, condiments, foodstuffs, and local uncleanliness. He selects for his investigation a few agents that are intended to be the bitter enemies of such conditions, a few of the many drugs and preparations that are in daily use as antiseptic detergents by the laity, and, more or less, as therapeutic agents by the profession. The names of these preparations signify but little, as they are nearly all of proprietary or commercial origin, with the ingredients incorporated according to the ideas of each originator. These powders, pastes, and washes *ad infinitum* contain a variety of organic and inorganic mixtures, with coloring matter introduced to suit the individual fancy; perhaps in a few cases the shade of color is developed by spontaneous chemical change or through chromo-atmospheric influence.

We can easily understand the effects on the teeth of the familiar coloring matters, such as anilin, blue and red, carmine, hematoxylin, etc. But when teeth are colored by preparations which have no coloring matter added, we cannot prognosticate the extent or the exact cause of such effects, except by sufficient experimentation. Indeed, the knowledge of the spontaneous interaction between carbon compounds and their coloring effects on organized structure, vital or non-vital, in connection with the lively chemical action prevailing in the average human mouth, is still in its infancy.

In reading over Dr. McGehee's monumental work, we find that the worst offenders may be reduced to seven. Six of these, including powders, pastes, and liquids of various composition, are colored artificially, and this objectionable feature can be easily eliminated without injuring their value. No. 7, however, which contains perhaps no artificial coloring, we find affects the color of the tooth substance more than any of the other preparations, and the question naturally arises, Shall we discriminate against this, in my opinion, excellent collutory on account of this one fault, great though it be? It is presented ready for use by one of the best pharmacists in the profession. Its combination of inorganic and organic antiseptics is ideal, and its slightly acid character, intended to inhibit the growth and multiplication of acid-forming bacteria, conforms with the latest scientific views. Whatever be the cause of the coloring effect, a phenol or derivative of essential oils assisted by oxygen in the nascent state, can be replaced by an equally effective non-coloring substitute.

The results of Dr. McGehee's gigantic work may be a blessing in disguise in another direction than the one intended. Perhaps Dr. McGehee has unwittingly placed his name on the roll of fame, not

only by his successful experiments, which are in accordance with and in advance of Dr. Head's proper advice, but also by proving the fact that certain mouth-washes, not artificially colored, penetrate the enamel and dentin, thereby suggesting the possibility of embalming the dental tissues against caries through deposits of resins, oleoresins, camphors, etc.

Perhaps the reprehensible practice of the Ceylonese, from time immemorial, of thoroughly blackening their teeth is persisted in not so much for the purpose of adding to their personal beauty as it may mark a prophylactic effort to render these organs immune from the otherwise ever-present danger of disease.

Dr. H. T. SMITH, Cincinnati, Ohio. I have seen so much of Dr. McGehee's work for the preparation of this paper, that I wish first to impress you with the large and very evident amount of time and labor that he has expended.

Dr. Cassidy has discussed discolorations from the chemical standpoint; I should therefore like to say just a word in regard to the distinctly histological features of the subject.

Dr. McGehee has shown that teeth are readily stained in the mouth by the persistent use of mouth-washes—collutories.

This being the case, the most regrettable incidents of such staining occur in the mouths of the young and middle-aged, before the teeth naturally discolor from food habits, tobacco habits, or reparative dental operations. The enamel covering in young teeth is, as a rule, intact, little if any dentin being exposed on the incisal and occlusal surfaces. These preparations, therefore, must exert staining effects *upon*, or *in*, or *through* enamel surfaces.

In the enamel, nature has provided a curious and beautiful tissue that resists the wear and tear of daily use and abuse, but in which little or none of the usually well supplied organic tissue is left. How, then, does enamel take up the staining agents?

Enamel is entirely wanting in vascularity. The organic reticulum which Heitzmann and Abbott imagined they saw in enamel, and which they thought took up hematoxylin and eosin stains, has been proved not to exist. If it did it would help us to understand the entrance of the mouth-washes which Dr. McGehee has mentioned. The enamel prisms are highly calcified, and hardly less so is the interprismatic substance.

The question therefore arises, Is there a constant flow or passage of salivary moisture through this dense substance? We have all seen the change of color or translucence in teeth when they are dried, with the rubber dam in position.

The problem before us is easily explained in regard to the dentin. The tubular, organic, and fibrillar structure of this tissue is well understood; it readily absorbs liquids and even permits their rapid penetration if introduced by means of high-pressure syringes.

The analyses of enamel given by Von Bibra and others indicate the presence of 3.6 per cent. of organic matter; but this is determined by the loss of weight upon ignition in the analysis, and Tomes shows that this loss is occasioned by the rapid expulsion of the water of composition in the calcium salts. Therefore it may be said that there is no organic matter in enamel.

The enamel of some animals is permanently stained. Examples are found in the reddish incisors of the squirrel, and still better in the highly colored teeth of the beaver, and it may be interesting to note in this connection that the order

of marsupials, the kangaroo and the opossum, the latter being the only surviving representative of this order in America, exhibit excellent examples of tubular enamel, the dentinal fibrils and tubules penetrating the enamel structure in large numbers.

In the human tooth we believe that the various shades of color reside in the dentin, and that the enamel is translucently colorless.

There may be a natural flow of moisture through the enamel, resembling osmosis, as through a fine stone disk, or through a membrane. If this is the case, we can account for the staining effects of mouth-washes, but we must still believe that the permanence of the stain rests in the protoplasmic—organic—tissue of the underlying dentin.

I leave this unexplained phase of the subject with you and Dr. McGehee for his future investigations, for I know that he is keen to expend another thousand hours upon these researches. I would remind you, however, of a fact often overlooked, namely, the relatively great thickness of the enamel in the human teeth, as seen in sections of teeth.

Dr. Johnson said yesterday that the use of mouth-washes is not to be encouraged, that healthy mucous and dental tissues do not need medication. This we may perhaps admit; but there is that perfect balance of waste and repair to be found that will show absolutely normal conditions in such a cavity as the mouth? Unnatural food habits, a slightly disordered condition of the saliva, of the oral or nasal mucosa, so frequently occur even in the cleanest mouths that antiseptic mouth-washes or dentifrices are almost essential, and under the influence of the present prophylaxis propaganda, their use will be considerably increased rather than lessened.

Dr. McGehee has rendered an important service in warning us of the dangers of accepting and prescribing compounds that stain the teeth.

Motion was then made and carried that Section III adjourn until the next annual meeting of the association.

PUBLIC ORAL HYGIENE MEETING.

THE meeting was called to order in the auditorium of the Brotherhood of Locomotive Engineers' Building, Cleveland, at 8 o'clock, Wednesday evening, July 26th, by the president, Dr. E. S. Gaylord, who introduced Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee, as chairman of the meeting.

Dr. W. G. EBERSOLE then presented an address entitled "History of the Oral Hygiene Campaign as Inaugurated by the Oral Hygiene Committee of the National Dental Association," as follows:

History of the Oral Hygiene Campaign as Inaugurated by the N. D. A. Oral Hygiene Committee.

By W. G. EBERSOLE, M.D., D.D.S., Cleveland, Ohio.

BEFORE presenting the sealed report of the experimental work upon the Marion school "dental squad" to the president of this association, we desire to make a statement of the conditions that led to the production of the evidence proving the actual value of dental service to humanity.

Twenty-odd years ago, the present chairman of your committee became impressed with the terrible inroads that dental caries was making upon the health, strength, and beauty of the American people.

So deeply was this fact impressed upon him that he became convinced that of all the professions—and he was then a law student—dentistry offered the greatest opportunity to benefit humanity as a whole. He became imbued with the thought that if a man were to enter the dental profession with the idea of teaching humanity the proper care and use of the mouth, he would be in position to give to humanity a service of greater value than that rendered by any other calling.

The study of law was abandoned, and that of dentistry and medicine begun and finished. The first paper contributed by him to dental literature was one advocating a number of the policies that are being pursued today by your committee.

BEGINNINGS OF THE ORAL HYGIENE MOVEMENT.

At that time neither the profession nor the public were ready to lend support to this movement. Thirteen years ago, however, a circular letter was addressed to the teachers by the then superintendent of public schools, containing facts which were prepared by the Oral Hygiene Committee of the Cleveland Dental Society. It is as a result of this circular letter that we shall be able to present to you, later in the evening, one whose interest in mouth hygiene began at that time.

Years of constant toiling seemed to have availed little. Two years ago last March, following a somewhat successful service on behalf of this body, at Birmingham, the present chairman of your committee was told that he was due for appointment on one of the committees of the association, and was asked if he had any special preference. He replied that if his services were desired and he was to express a preference, he would rather be a member of the Oral Hygiene Committee of the National Dental Association than of any other of its committees. Great was his surprise when he was notified that he had been selected as chairman of that committee.

Upon his return home he began to study the work which had been accomplished by your committee during the ten years of its existence. He found that it had been very active, and had made many recommendations to the association, without receiving any encouragement or recognition from the association proper. In fact, he found the members of the committee, who had been ac-

tive for years, greatly disheartened, and it was only after considerable persuasion on his part that a number of them were willing to serve longer.

Up to March 1909, the policy of the National committee, as well as the policy of local committees throughout the country, had been to consider the oral hygiene proposition from a philanthropic standpoint. The new chairman of the committee counseled a radical change in this connection, and insisted that the rational method of dealing with this question was from the educational or economic standpoint, and advised such a change in policy; and, after considerable correspondence with the members of his committee, he received their unanimous indorsement of such a policy.

POLICY ADOPTED FOR THE NATIONAL EDUCATIONAL CAMPAIGN.

An entirely new policy was outlined. It was agreed to open a national educational campaign, eliminating entirely the philanthropic side of the question.

In adopting this new policy the committee decided to begin operations through the three greatest educational institutions in the country—the public school, the public press, and the public platform. It decided that if its educational or economic policy was to be of any great value, a series of experiments must be carried on with a view of demonstrating the value of healthy oral conditions as related to the welfare of mankind.

Cleveland being the home of the chairman of the Oral Hygiene Committee of the National Dental Association, who was also chairman of the Oral Hygiene and Educational Committee of the Cleveland Dental Society, and Cleveland being also the home of Dr. W. T. Jackman, chairman of the Oral Hygiene and Educational Committee of the Ohio State Dental Society, it was decided to begin operations in this city.

CO-OPERATION OF THE CLEVELAND PRESS.

The first step which was considered necessary in undertaking this work was to secure the promise of co-operation on the part of the newspapers, and to obtain from them an agreement to publish articles without making use of the names of the men who were at the head of the work. I am glad to say that the papers entered heartily into the campaign, and in over two hundred articles, large and small, the agreement was not violated excepting in five or six articles.

CO-OPERATION OF THE CLEVELAND BOARD OF EDUCATION.

The next step necessary in attempting this work was to secure entrance to the Cleveland public schools.

An application was presented to the Cleveland board of education asking that we be permitted to examine the mouths of all the children in the Cleveland public schools, making records of actual conditions found, and sending a copy thereof to the children's homes; that we be permitted to deliver lectures to the pupils, teachers, and parents in the school auditoriums, and to establish four clinics for the purpose of taking care of the mouths of the indigent poor.

We stated that through the service rendered in the dental clinic we should be able to show the value of healthy oral conditions, and that we expected to be able to demonstrate that the average working efficiency of the children treated in these clinics would be increased fifty per cent.

Having a thoroughly progressive and up-to-date board of education at the

head of our public schools, our requests were granted, and hearty co-operation promised in the carrying out of these experiments.

CO-OPERATION OF THE OHIO DENTAL ORGANIZATIONS.

It then became necessary to unite the dental organizations in this section of the country for the purpose of carrying out our obligations, and this was done in the following manner:

The chairman of the Oral Hygiene Committee of the National Dental Association obligated the committee to furnish the equipments for establishing the clinics, and the chairman of the Oral Hygiene and Educational Committee of the Ohio State Dental Society obligated his committee to furnish all supplies and printed matter necessary to render this service.

Upon the Cleveland Dental Society fell the brunt of the great work to be undertaken, and it obligated itself to make all the examinations, deliver lectures in all the schools, and operate the clinics for a period of one year.

CONTRIBUTIONS FROM MANUFACTURERS OF DENTAL GOODS.

Having secured the co-operation of the board of education, the public press, and the various dental organizations, application was made to the leading dental manufacturing establishments for the *loan* of dental equipments for the various clinics. Four such clinic equipments were sought, and six were contributed, the Harvard Co., the Ransom & Randolph Co., the Ritter Dental Mfg. Co., the S. S. White Dental Mfg. Co., the Lee S. Smith & Son Co., and the Consolidated Dental Mfg. Co., each contributing a full equipment for a clinic.

FINANCING THE NATIONAL CAMPAIGN.

We were then ready to begin operations, but were entirely without funds to carry on such a campaign as your committee desired. A meeting of the committee was called for the purpose of devising methods and means of securing funds which would enable it to carry on a national campaign in such a manner that it would not only command and hold the attention of all the dental organizations in this country, but that it might be opened in such a way as to create a deep interest on the part of the educational and health organizations.

This meeting was held at the Hollenden Hotel, in this city, December 4, 1909, with Drs. Corley, Grady, Dameron, and Ebersole present.

Investigation showed that the National Dental Association had insufficient funds to be of any particular value in connection with this work, even if the organization felt inclined to show special favor to its committee. Many methods and means were discussed for financing the national campaign, all of which seemed to offer insurmountable difficulties.

Fortunately, just after the call for this meeting had been issued, the chairman of the committee learned that the Dental Manufacturers' Club had appointed a publicity committee, which was authorized to prepare and present to that organization a plan for educating the public as to the value of dental service. This committee was invited to be present at a conference in connection with the National committee. At this conference the policy of the National committee was presented to the representatives of the Dental Manufacturers' Club, and it was stated that all we needed was the money to set the machinery working.

We were invited to send a delegate to their meeting, which was to take place on December 10 and 11, 1909, at Baltimore. The chairman of the National Committee on Oral Hygiene was selected to present the policy of the committee to the club at that time.

Just following the conference of the National Committee on Oral Hygiene and preceding the meeting at Baltimore with the Dental Manufacturers' Club, the Ohio State Dental Society meeting was held, and the National committee's new policy of dealing with the oral hygiene question was presented to the state society's Committee on Oral Hygiene and Education, and they, after accepting the policy as the most rational basis upon which to work, presented it to the Ohio State Dental Society, and asked for a contribution of $500.00 for the purpose of carrying out such a policy in the state.

This appropriation was made without a dissenting vote, and the Ohio State Dental Society was the first to go on record as voting a large sum of money to the teaching of oral hygiene from an educational and economic standpoint. Last December this society again voted $500.00 to state work, and then gave $100.00 to the National Dental Association's committee.

Following the Ohio State Dental Society meeting, the chairman of your committee attended the meeting of the Dental Manufacturers' Club at Baltimore, and presented to them the policy that had been adopted by your committee. This organization was very enthusiastic in its indorsement of this policy as being the most rational method that had been presented by the profession for educating the public to a point where it would realize and understand the relationship which the human mouth bears to health, strength, and beauty.

It was explained to the club that our forces were thoroughly organized and that we were ready for work, but lacked the funds to carry on such a campaign as we desired to conduct. We asked their committee to refrain from taking any active part in an educational campaign, and requested that they turn over to your committee any funds that they might feel inclined to spend in such a campaign as they contemplated carrying into execution.

They were told, however, that if they contributed funds to carry on our work, these funds must be given to your committee absolutely, without any "strings" being attached to them other than that the funds were to be used in carrying out the policy of your committee as presented to that organization.

They voted to place $3000.00 at our command, and later in the year increased that amount to $4000.00, which amount they made arrangements to place in a Cleveland bank, subject to the order of the chairman of the Oral Hygiene Committee of the National Dental Association.

This, upon second thought, did not seem a wise policy to the chairman of your committee, and with a view to avoiding any possible accusation of graft in the matter, he requested that the publicity committee of the Dental Manufacturers' Club handle these funds and simply honor his "o.k." of bills as they would be presented from time to time; and this policy was pursued.

OPENING OF THE NATIONAL CAMPAIGN.

Having secured these funds, plans were started to open a national campaign early

in the month of January, but owing to the very severe illness of the chairman of your committee, this was delayed until March 18, 1910. It was then opened in such a manner that the attention of not only the entire dental profession was called to it, but thousands of invitations were extended to health and educational organizations all over the country.

The President of the United States and the governors of every state in the Union were invited to be present. President Taft and Governor Harmon sent personal representatives.

The notable features in connection with the opening of this campaign were the dedication of the six clinics by the National Dental Association, and the opening of the same by the Cleveland Dental Society, which took place during the forenoon.

The afternoon was devoted to the public school session. A notable feature in connection with this was that Cleveland's twenty-one hundred school teachers were in attendance by request of the board of education. The meeting was presided over by the president of the board of education, and addressed by members of the educational staff and by members of your committee, together with representatives from the state and local committees.

The evening meeting was devoted to the formal opening of the national campaign, and addresses were made by Dr. W. A. Evans of Chicago, Dr. C. W. Wille of the United States Public Health and Marine Hospital service, representing President Taft, Dr. H. C. Brown of Columbus, representing Governor Harmon, and the chairman of your committee, representing the National organization.

THE CLEVELAND EXPERIMENTAL CLASS.

Almost immediately following the opening of the national campaign, the chairman of your committee became convinced of the impracticability of obtaining facts and figures of practical value by attempting to follow the results of dental services which were rendered to children scattered throughout the city. He therefore sought and secured the privilege of selecting a certain number of children in connection with one particular school for the purpose of carrying on definite experiments.

The services of Dr. J. E. W. Wallin, who was then director of psychology in connection with the Cleveland public schools, were offered and accepted, and he agreed to prepare a series of psychological tests to be used in connection with this experimental class.

The services of Miss Cordelia L. O'Neill, principal of Marion school, who had been very enthusiastic over the work, were sought in the selection of an experimental class, and she and the dental examiners selected forty children whose records showed the worst oral conditions out of an enrolment of eight hundred and forty-six pupils.

These children were assembled, and it was explained to them that the dental organizations desired to put their mouths in first-class condition and teach them how to care for and use the same, for the purpose of demonstrating to the world the importance of having healthy mouths. They were told that a nurse would be placed over them to teach them how to care for and use their mouths, and that those who remained faithful to the end of the year would receive a five-dollar gold piece.

At the first meeting for taking the psychological tests to show the working efficiency of the children at the time when they were received, thirty-five of the forty children responded, and expressed a willingness to comply with the conditions. Of this number twenty-seven fulfilled the requirements, and it is the records of these children that we have the pleasure of presenting to this organization tonight.

CRITICISMS OF METHODS PURSUED BY THE ORAL HYGIENE COMMITTEE.

Frank and free as was your committee in its statement of its policy and methods, and notwithstanding its hard work, criticism was excited, and no sooner had the announcement been made that we had received funds from the Dental Manufacturers' Club than the cry went up from two or three parts of the country that your "committee had sold out the National Dental Association to the dental manufacturers;" that your "committee had dragged the good name of the National Dental Association into the dust and dirt of commercialism."

Your committee felt that there would be some criticism offered by some of the members of the association as to the sources from which it received funds to carry on its work; but it believed that when it was made plain that the money was given without any restrictions or obligations being placed upon the association, except that the money was to be used in carrying out the policy of its own committee, these objections would be removed.

But, in spite of the explanations made at Denver, there still existed a decided difference of opinion, which was expressed by a few members of the association in such a forcible manner that the Executive Council felt that, in the interest of peace and harmony, it had best recommend and have passed some resolution which would limit the activities of its committee for the following year.

RESOLUTION PASSED IN REGARD TO FINANCES.

Your committee recognizes and acknowledges that differences of opinion which existed were undoubtedly honest, and respects them accordingly.

It also believes that the Executive Council, in recommending and having passed by the association the following resolution, felt that it was acting in the interests of the association. We have no criticism to offer from that standpoint, nor have we any desire to criticize from any standpoint that which we believe was an honest difference of judgment. Our object in referring to the matter is simply to show the influence which the passage of this resolution had upon the work of the committee for the past year.

The resolution, which speaks for itself, is as follows:

The Executive Council recommend—

That the association commend the energy and enthusiasm with which the Committee on Oral Hygiene took up its work, and the results obtained during the past year; however, we would suggest that the scope of the work in the future be conducted along lines and under such rules and regulations as shall be formulated by the committee and approved by the Executive Council.

That the sum of One Thousand Dollars be appropriated by the association for the work of the committee, if there shall be sufficient funds in the treasury not needed or required for other necessary work, and the same to be expended under the direction and approval of the Executive Council. No funds shall be solicited or received for the work from any source except state and local dental societies, members of the dental profession, and philanthropists.

The passage of this resolution necessitated the abandoning of a number of the plans and policies which the committee believed to be of great importance both to the profession and the public, and was very much of a disappointment to some of its members. Most of them knew what it meant to try to raise funds from the dental profession and from philanthropists in order to carry on the work.

FINANCIAL CONTRIBUTIONS FROM DENTISTS AND DENTAL SOCIETIES.

Believing that if the work could be continued results would be obtained which would justify every measure employed, they agreed to stand shoulder to shoulder in this work.

At a meeting of the committee held at Buffalo, November 16, 1910, with Drs. W. A. White, H. C. Thompson, J. P. Corley, and W. G. Ebersole present, it was decided to make a first appeal to the profession by asking the members of the Executive Council and the officers of the association to join it in starting a fund by making a contribution of $10.00 each.

We are glad to say that the following officers and members of the Executive Council responded: Drs. E. S. Gaylord, E. R. Warner, Chas. W. Rodgers, H. C. Brown, Arthur R. Melendy, H. J. Burkhart, B. Holly Smith, James G. Sharp, C. L. Alexander, and W. E. Boardman; of the Oral Hygiene Committee—Drs. H. C. Thompson, J. P. Corley, W. A. White, and W. G. Ebersole.

Following this a strong appeal was made to every dental organization in the country, and through these organizations an appeal to every individual member.

From this source we have received up to date the following amounts: $120.00 from the Southern Branch of the National Dental Association; $100.00 from the Ohio State Dental Society; $25.00 from the Nebraska State Dental Society; $25.00 from the Pennsylvania State Dental Society; and $10.00 from the York (Pa.) Odontological Society.

The total amount received by your committee, due to their solicitations from the members of the profession and the various dental organizations, amounts to $420.00, an amount which would not go far toward carrying on such a campaign as we had planned. Thus we have been very severely hampered for the want of funds in carrying on the work which has been undertaken.

HIGHLY GRATIFYING CHARACTER OF THE RESULTS OBTAINED IN THE EXPERIMENTAL CLASS.

I wish to say to the president and to the members of the National Dental Association that I was personally responsible for the acts which led to placing the committee in the embarrassing position under which it has labored during the past year.

This being the case, I felt that it devolved upon me to see that the committee was given an opportunity to vindicate itself, and it was for this reason, Mr. President, that your position relative to the oral hygiene campaign which the committee was conducting was so earnestly sought early at the Denver meeting.

Later, in securing your promise to use your influence to see that the committee was continued through your administration, I told you that if the committee should be reappointed, it would upon this occasion present to you, from a scientific standpoint, facts and figures relating to the care and use of the human mouth that would not only astound the laymen of this country, but would astonish every member of the dental profession.

You fulfilled your promise; it now remains for me to fulfil mine.

At Denver I told you that when the scientific experiments which we were conducting at Marion school were finished I believed that the improvement in working efficiency would show an average increase of at least fifty per cent. And this, you will remember, we both agreed would be a very high percentage of increase.

In the sealed report which I shall hand to you later, supported by the actual records made in carrying on this series of experiments, I shall present evidences of an increase in working efficiency for these twenty-seven children so much in excess of the promised fifty per cent. that, when the final results were worked out and became known to those of us who were in closest touch with these experiments, the results simply carried us off our feet.

I have always maintained that when the dental profession fulfilled its true obligation to mankind it would and should rank with the medical profession in the importance of its service. Tonight I have the pleasure of presenting to you the final report of a series of scientific experiments which show such a percentage of increase in the working efficiency of the class in question that it must necessarily force others to the same belief.

EFFECT OF THE ORAL HYGIENE CAMPAIGN ON THE STATUS OF DENTISTRY.

Your committee believes that the facts and records herewith presented comprise one of the most valuable, if not *the* most valuable, scientific discovery in the history of dentistry; and it believes that instead of compromising the good name of this association by seeking and accepting the funds which made this work possible, it, by its acts, gave to this association an opportunity to assume the place which it should occupy in a matter of such vital importance both to the profession and the laity; and this could not be done without funds.

Your committee believes, indeed it knows, that through its activities and the publicity given the same, this organization is given greater consideration and is looked upon with deeper interest at the present time, both by the profession and the laity, than at any time in its history.

I want, personally, to say to the president and to the members of the National Dental Association that it was the national oral hygiene campaign as planned and conducted by your committee that made it possible for the profession to receive the rank and recognition accorded it during the past year by municipal, state, and national governments.

Tonight this committee comes to you with the records obtained in carrying out a part of its policies, which places the dental profession in a position to prove in dollars and cents the actual value of its services to mankind.

It shows that in health conservation, dental service plays so important a part that no other profession can equal, let alone excel it in the value of services rendered.

Dr. Ebersole then addressed the president, Dr. Gaylord, as follows: Mr. President, in this sealed envelope which I hand you is the final report of the scientific experiments conducted upon the Marion school "dental squad"; and in this package are the actual records from which these data have been obtained. They are submitted for the purpose of meeting and answering any question of accuracy that may be raised by any doubt-

ing brother. It is with pleasure that I present this evidence.

Dr. E. S. Gaylord. I take great pleasure in reading this report:

The Oral Hygiene Committee of the National Dental Association, the Oral Hygiene and Educational Committee of the Ohio State Dental Society, the Oral Hygiene and Educational Committee of the Cleveland Dental Society, beg to announce that the final results of the experimental work done by the Marion school dental class show an average increase of 99.8 per cent. per pupil.

Mr. Chairman, we have listened with exceeding interest to the minute and exhaustive history of the early conception and final culmination of your efforts in this great work of human relief.

You have met obstacles, both in finance and criticism, and we have nothing but admiration for your persistent effort in surmounting these difficulties.

The work conducted by you and your committee is of such inestimable value to suffering humanity that I hesitate to intrude even an opinion, and indeed I deem it unnecessary to do other than point to its record as demonstrated by the Marion school class, and to express admiring appreciation of the faithful associated co-workers who have so patiently and successfully conducted the work up to the stage which you at this time reveal.

The percentage of improvement in these young people is so far beyond our expectation that any expression of appreciation would fall far short of what is justly your due. The work and your detailed report stand before the world as unimpeachable evidence of its value to all humanity.

To be the medium through which the National Dental Association receives the detailed record of this work I deem a privilege beyond estimate.

Dr. Ebersole. I have to perform at this time one of the most pleasant duties ever accorded me in my lifetime. I have the pleasure of presenting to you one who has or should have heartfelt thanks from every member of the dental profession throughout the country, a lady who has entered into the work of aiding the profession to prove its actual value to mankind. This lady's attention was brought to the question of mouth hygiene thirteen years ago, when the dentists of this city made their first attempt at having the school children receive instruction in mouth hygiene. She has at the present time a scrap-book, which she values very highly, in which is to be found a copy of this first effort of the dental profession, a letter to the school teachers by the superintendent of public schools which contained facts furnished by the dental profession. From that time on she has been interested in mouth hygiene. I have the pleasure of presenting to you Miss Cordelia L. O'Neill, principal of the Marion school, with the Marion school dental class, which has rendered it possible for us to secure the evidence presented this evening. (Applause.)

Miss O'Neill then presented an address, entitled "Oral Hygiene as It Appeals to Educators," as follows:

Oral Hygiene as It Appeals to Educators.

By CORDELIA L. O'NEILL, Cleveland, Ohio,
PRINCIPAL OF THE MARION SCHOOL.

We are today in the maelstrom of a movement for conservation: waste and loss are measured from every standpoint; the gospel of efficiency is being preached in every line of business. The scientific management even of the shoveling of ore, the laying of brick, or the manufacture of machinery is studied until the efficiency of the workman is raised to the highest degree, and loss of time or labor reduced to a minimum.

THE ENVIRONMENT OF THE MODERN CITY SCHOOL CHILD, AND ITS EFFECTS.

If we allow ourselves for a moment to think of the rapid changes that are being made in our mode of living, our methods of travel, and our conduct of life, we shall be impressed with the necessity for utilizing our forces to the greatest advantage.

This necessity is very marked in the field of education. In the year 1830 but 5 per cent. of our population in the United States lived in the cities; today very close to 70 per cent. are so domiciled. Think of what that means to education! With 95 per cent. of the children out in the open fields, breathing the pure air of the country, nourished with food that had not undergone adulteration, and trained in the varied pursuits and crafts of the farmer boy and girl of that day, it is not surprising that little thought was given by the educator to the physical welfare of his pupil.

Now contrast that life with that of 70 per cent. of the children of the United States today, 50 per cent. of whom may be said to live under typical urban conditions—close housing quarters, tainted and smoky city air, limited advantages as to nourishment and recreation, with fewer duties and obligations such as exercise the muscles and quicken the intellect.

When little Sam returns from school today, he need not bring in kindling-wood and coal. His mother turns on the gas to prepare the evening meal. He does not take a long walk down the lane and out through the open pastures for the cows. The bottled or condensed milk is purchased at the corner grocery and delivered in sealed packages to the house. So may our contrast continue, until we find the children limited to the activities of the streets—selling papers, doing errands, or, if not directed in lines of thrift, "running with the gang." This picture, modified to meet the boy in the high-priced apartment house—if he is fortunate enough to be admitted there—has given the educator of today a problem.

The gymnasium and playground were called upon as a substitute for the more natural vigorous activities in the effort to produce the healthy body of the future good citizen; but this has not proved sufficient to build upon to insure vigorous manhood and womanhood;—and so the dental and medical professions have come forward.

When a child was close to nature, nature took care to correct the imperfec-

tions made by unintelligent civilization. But when outraged nature is overtaxed by the rush and hurry of a city existence, she refuses to cope with the situation, and we are rearing a race of weaklings for future citizenship.

The great need of conserving the child for the nation appeals strongly to us. We cannot send him back to the country to live; we must deal with the condition as it exists—hence modes of training to aid his perfect development take the place of his former simple life.

THE INCREASE OF EFFICIENCY OF SCHOOL CHILDREN BY SCIENTIFIC MANAGEMENT.

The purpose of this paper is to give evidence of what may be done to increase the efficiency of the child if a scientific management be established.

An experiment along these lines has been made at the Marion school. This school is situated in the congested section of the city, and its pupils come from eighteen city blocks, which territory also supplies pupils to three parochial schools. The conditions might furnish results that may be found in similar quarters in any city. It has also furnished a proof of what may be done in such a community by fostering the higher ideals of living.

DENTAL EXAMINATIONS OF THE MARION SCHOOL CHILDREN.

In June 1909 there appeared at our school one Monday morning ten dentists and ten nurses or attendants, sent, by previous arrangement with the board of education, to obtain an idea of the condition of the children's mouths.

Inspection was made of 846 children, and a dental chart was marked for each child. Out of the 846 examined just *three* children were found whose teeth were in perfect condition, one a colored boy eleven years old, another a Slavish girl of ten years who had been in America about six months, and one, an American-born child, age twelve, who was of Russian parentage. One little lad was found to have three abscesses, two well developed and the third forming. (Would it be surprising if he annoyed his classmates or refused to conform to the simplest regulations of the school?)

Such a condition was naturally startling, and we were very much gratified to have the board of education authorize a more specific examination the next year.

Dr. L. A. Krejci conducted this examination at our school. Two classes of about forty children each were examined in a day. Duplicate charts were made, one being kept by the dentist and one sent to the parents of the child. When the examinations of the schools were completed, Dr. Ebersole requested that a special class be formed for observation and study. The purpose was to ascertain what effect, if any, would be produced on the child physically, mentally, and morally by attention to the proper use and care of the oral cavity.

EFFECT OF MEDICAL SUPERVISION AT MARION SCHOOL.

For four years preceding the beginning of the dental work, we had at Marion school the volunteer services of a skilful and exceptionally well-equipped physician, who conducted the medical inspection of our children. His almost daily attention, aided somewhat by special emphasis on physical culture and daily rhythmic drill, had completely transformed the children in our school district. Though living under the same social, economic, and industrial conditions as pupils in adjacent school dis-

tricts, the children at Marion school invariably impressed visitors, official or otherwise, as being children of a more fortunate type physically, morally, and mentally. Knowing, therefore, what medical inspection had done for us, I took precautions before beginning the dental experiment to so safeguard our medical record that no credit would go to the oral hygiene work that rightfully belonged to general medical efforts. I was willing to grasp and aid any additional movement for the betterment of the growing child, but each recourse must stand on its own merits. While I was by no means antagonistic to the movement for oral hygiene, I was very jealous of the records that we had previously made in improving our children.

METHOD OF CONDUCTING THE ORAL HYGIENE TESTS AT MARION SCHOOL.

In order, therefore, that the Oral Hygiene Committee could not take credit for work done by others, I took the pains to secure written statements of conditions from reliable people who had seen the work. I have not needed to use them—in fact I have become more convinced than those who were trying to convince me!

If this was to be a scientific experiment, it must be conducted with the utmost accuracy possible. All of you who have dealt with children know that they can be made to perform phenomenal feats if skilfully handled. It was our firm determination to keep in every way possible the efforts and environment of these children absolutely normal, and have as little attention as possible directed to the children and to their work, and no undue pressure brought to bear.

Our sessions were held after school, when all other children had been dismissed for home. Only what was absolutely necessary was ever said in the building concerning the work and the children. So little attention did they attract for the first six months that many of the teachers in the building did not know who of their own pupils were in the class. Of course the distribution of the five-dollar gold pieces at Christmas time, of which I will speak later, made any further quietude an impossibility. Fortunately by that time our work was practically ended, and publicity could do no harm. Then, again, we conducted the psychological tests with as great a degree of uniformity and accuracy as was possible. In fact we can publicly vouch that nothing was in any way done that would influence a favorable result. What we have attained have been as nearly normal results as it is possible for human effort to attain, and are due, I believe, wholly to oral hygiene.

With a mental attitude as described we organized our dental squad. With the assistance of Dr. Krejci, the examining dentist, the charts for all the children, from the fourth to the seventh grade inclusive, were looked over. We did not consider any eighth-grade children, because they were soon to leave us for high school, nor any below the fourth grade, as their limited abilities would make the results of the psychological tests practically valueless to us.

Out of the entire number of charts in the grades mentioned, forty (a little more than 10 per cent.) were selected as showing the greatest number of defects. (In the investigations made by the U. S. Commissioner of Labor, 10 per cent. was considered a basis upon which conclusions might be reached.) It developed that among the forty whose charts showed the worst condition were some of our best pupils and some of the opposite element;

in fact it typically represented the school. This we deemed a most happy choice.

Conditions for the Marion school dental squad. The forty children were assembled after school on May 18, 1910. Dr. Ebersole explained what was required of them: (1) They were to have their teeth put into perfect condition at no expense to themselves. (2) They were to brush their teeth carefully three times a day. (3) They were to masticate their food properly, not using liquid with solid food. (4) They were to attend any and every meeting of the class called, and take from time to time psychological tests, and were to conform to regulations laid down by Mrs. Van Gastle, who was to act in the capacity of supervising nurse. As a reward for this co-operation each child who faithfully lived up to the requirements was to receive a five-dollar gold piece on the Friday preceding Christmas. To make the reward more tangible and real, Dr. Ebersole gave the gold pieces to me in the presence of the children, and I held them in trust for them. It was necessary that something attractive be offered to have their faithful co-operation. It could hardly be expected that the juvenile mind would appreciate the value of experimental proofs of dental prophylaxis, and from a purely altruistic motive conform to a series of new and taxing regulations, hence the wisdom of the reward in gold. At this time, also, each child was given a tooth-brush, a bottle of tooth-powder, and a plain drinking-glass. Dr. Ebersole thoroughly explained the process of brushing the teeth, which to some of the children was something entirely new. Immediately five withdrew because they would not assume the burden. Of those who remained, seven were in the seventh grade, thirteen in the sixth, nine in the fifth, six in the fourth grades. Later, at different times, three were dropped from the class because of failure to attend the tests, and five were dropped because they did not keep their teeth clean and live up to the rules generally, leaving twenty-seven who remained faithful to the end.

Psychological tests. These were a set of six psychological tests prepared by Dr. Wallin, the psychological expert. The tests were planned to ascertain standards in memory, accuracy of perception, rapidity and accuracy of thought, and spontaneity of association and differentiation.

Six tests were given, two before the work was begun on the children's teeth, two while the work was being done, and two a sufficient length of time after the mouth had been put in perfect condition.

Lessons in mastication and insalivation. Two special tests were given in the interim merely to illustrate to some interested parties what was being done. In June 1910, about four weeks after the beginning of the work, a practical lesson in mastication and insalivation was given by Mrs. Van Gastle, the nurse. Puffed wheat and cream were served the children, who, in partaking of the food, chewed and swallowed according to directions.

At this time the process and necessity of properly chewing the food were carefully explained, and all questions asked by the children were carefully and minutely answered. This started them intelligently in that phase of the work.

Lessons in the use of the tooth-brush. In September 1910 the children were assembled and tested as to their ability to brush their teeth. They showed a vast improvement over what they had been able to do in the beginning.

Test dinner. They were then invited to a three-course dinner, prepared by the

school and served in the building. The meal consisted of roast beef, potatoes, tomato salad, wafers, grape jelly, and dessert. After they had finished eating, each child was served a glass of water.

At that meeting one of the boys said that he had been in the habit of drinking six and eight cups of coffee a day, but since beginning to chew as he had been taught, he had lost the taste for coffee, and now sometimes did not drink one cup in two or three days. Most of the children took the trouble to explain how much better they liked the new way of eating. Many interesting and varied accounts were related which showed how thoroughly they had taken up and were pursuing the prescribed course of action.

Operative dental work. In the meantime Drs. Loupe and Moffett were treating the teeth of each child. Regular appointments were made and the teeth of each child put in good condition. Dr. Chas. K. Teter performed what extractions were needed, and Dr. Varney Barnes did some work in orthodontia.

CHARACTER OF THE MEMBERS OF THE "DENTAL SQUAD."

So much for the work done; now for results. As has been mentioned before, selecting only according to the record on the charts gave us children of various types. We had some who were well behaved, earnest, and bright children, and we had some of the most disobedient, reckless, and troublesome ones. The class, as it first presented itself, notwithstanding all that had previously been done for them, was not prepossessing. One of the brightest and nicest girls in the class suffered very frequently from sick headache. Most of them had sallow, muddy complexions, and three of them were on the point of being taken into juvenile court for truancy. One little boy was a candidate for the "boys' school" because of incorrigibility. He was a nuisance to the school room and a terror in the school yard. The others were between the two extremes.

MENTAL EFFECTS OF THE "DENTAL SQUAD" EXPERIMENT.

Each case was closely watched, and each, as the work went on, showed marked improvement. The little girl subject to sick headaches not only was entirely cured, but her mother, who followed the directions laid down for the little daughter, found relief from the same trouble. Complexions cleared, a spirit of self-respect was manifest; truancy, indifference, and incorrigibility in these children disappeared.

In their mental tests they have made a very considerable gain, 99.8 per cent., which comes very close to doubling their ability.

The children who needed the improvement most were the ones who made the greatest gains. This gain of 99.8 per cent. was shown, as we have said, in the psychological tests. The tests were given one in May and one in June of 1910, the next one in August, then one in September. The last two were given on the 4th and 17th of May 1911. The longest time spent on one phase of the work during a test was less than three minutes, therefore the pedagogical principle of repetition could not be effective because of the lapse of time between each apperception. The mental picture was wholly effaced before the next test was given.

The increase in ability to do the work of the psychological tests is due to increase of power in the child rather than

to accumulated knowledge—a distinction that is of great importance to the educator. Such results obtained in the classroom distinguish the true educator from the drill-master.

The children's gain in health, self-respect, and knowledge of higher and better living cannot be marked in "per cent." But who will say that it is not equally if not more valuable? And the lesson in perseverance and continuity of purpose which they have had, while not adding anything to the dental experiment, can be placed in the column of assets.

Speaking of their perseverance, we would all say that the anticipated reward of five dollars in gold was an incentive to them. But the fact is that the five dollars was given at the end of seven months' work, and during the remaining seven months, or up to the present time, each and every child has been equally persevering, if not more so, and that with no reward in sight except what was known to be the real benefit that comes to them by faithful attention to oral hygiene.

Just before the close of school last May I asked the children to write me a letter telling me what they thought of this experience. The whole theme of their letters seemed to be gratitude for what was done for them. We should need no stronger proof of the efficacy of the work than the affidavits of the children themselves.

One of our school officials, after witnessing one of the tests and hearing some of the testimonials, very aptly remarked that in this day and age we might revise the expression, "Out of the overflowing heart the mouth speaketh," and say instead, "Out of the sanitary mouth the overflowing heart speaketh."

DATA CONCERNING INDIVIDUAL MEMBERS OF THE SQUAD.

We will now give some specific data concerning the different children: Sol Katzel, Frank Silverstein, Jacob Bernstein, Joe Todd, Lillian Gottfried, and Helen Wright did last year in twenty-four weeks the same work regularly done in thirty-eight weeks, and were graduated for high school in February instead of in June.

Frank Silverstein was quarantined on account of scarlet fever in his home. He helped nurse the younger children, and every one of the six children in the family contracted the disease except himself. The attending physician attributed his immunity to his healthy physical condition.

Helen Wright was weak and nervous, and subject to frequent headaches. Not only has she grown robust, but her headaches have disappeared.

Sam Katzel in May 1910 was in the sixth grade. In May 1911, one year later, he was graduated from the eighth grade, having accomplished two entire grades in one year. He had failed through indifference the year before.

Ben Dimenstein at our district athletic meet this year won first place in the lightweight dash and first place in standing broad jump, securing almost two-thirds of all the points won by the school. Last year, although competing, he did not bring us one point; he says that his success was due to oral hygiene.

Becky Goldstein has had, I believe, the hardest struggle in the class. Her teeth were very irregular, the worst case of malocclusion I have seen. During the winter her mother met with an accident and was taken to the hospital for an oper-

ation, leaving in Becky's care a baby two weeks old. This baby was the sixteenth in the family, and Becky the eldest daughter. For two months Becky, with the help of a younger sister and with the advice and help of some women of the neighborhood, cared for the baby, regulated the household, and came to school occasionally one or one-half day when she found some neighbor who would take the baby for a time. By so doing she kept in touch with the work at school, and was promoted with her class in June. But the most remarkable fact is that during that time, though she had not one unbroken night's rest on account of her anxiety for the baby, she retained her vigor and strength through it all.

Rose Lieberman, Lillie Semlakowsky, and Lillie Cohen have the prettiest sets of teeth, and made a most marked improvement in complexion. Their improvement may be said to be esthetic.

Annie Pankuch had severe kidney trouble, and was a fragile, delicate, nervous child. In every respect she has greatly improved, and is sturdy and well today.

Rachel Somers led her class in the last promotions.

Gussie Hammerschlag, Beatrice Kramer, Bertha Semlakowsky, Sarah Macklin, Frieda Goldman, Selma Perlick, and Helen Cohen have shown improvement in scholarship, behavior, health and appearance.

Issie Grey's father says that since Issie has entered the dental class he has improved so that he would not give him now for all his other children put together, and we have some very nice children from the Grey family.

Hannah Cohen has not had the full quota of mental endowments. She has been in America about three years, has had many difficulties to overcome, and made a gain of 444.82 per cent., besides improving greatly physically.

Ida Goldman has been the most timid child in the class. Her fear of the dentist was such that at first I remained with her, and held her hands while the dentist worked. She responded less readily, though she made a gain of 101.83 per cent.

Harry Freeman and Abe Meyer have been good, faithful, steady workers and have made gains, besides brightening up and showing physical growth.

The last and banner pupil is Morris Krause. Morris had ideas peculiarly his own as to what a boy's duties and privileges were. Those ideas were so much at variance with the conventional standards that difficulties arose, seemingly insurmountable at times. Since working with the class he has been manly, tractable, and does not even seem to have the temptations that repeatedly assailed him and were almost the means of his downfall. The result obtained for Morris alone was worth all our efforts.

THE LESSON TAUGHT BY ORAL HYGIENE.

I am thoroughly convinced of the efficiency of oral hygiene. I believe that if each child be taught to intelligently keep thoroughly clean and healthy the gateway to his system, the mouth, we shall have a healthier, more self-respecting, and all-around better class of citizens for the next generation. What has been done for these twenty-seven children may be done for every child. If we are called upon to educate children living in crowded city quarters, breathing varieties of harmful gases instead of pure air, eating food adulterated or sold from shops that display their goods uncovered and exposed to the germs that are scattered by that portion of our 600,000 population that

may chance to pass that way; if, as a distinguished physician of Vienna says, the majority of cases of pulmonary tuberculosis are contracted through the alimentary canal—then we must fortify our children by every means in our power;—and one of the most effective guns on our fortification is a practical working knowledge and training in ORAL HYGIENE.

Dr. EBERSOLE. I believe we have had presented to us tonight one of the most impressive lessons ever given to the dental profession. (Applause.)

I am going to ask these children, in leaving the stage, to go around the table, so that you can have a good look at them. I want you to try to fix their faces in your minds, because later we shall throw upon the screen, at the request of the lady who has presented the paper, the pictures of these children, showing them before and after treatment, and giving you an opportunity to judge of their improvement physically. Miss O'Neill, in looking over the slides which we shall present following Dr. Corley's paper, made the statement that they did not begin to show the actual difference, and I am sure you will see considerable difference even in the slides. Tomorrow morning at nine o'clock this class will be present at Gray's Armory and a practical test will be given showing how the records were obtained which show such wonderful results.

Before dismissing the class, I wish to present to you Mrs. Van Gastle, the lady who has watched over this class, and has been their mother, as it were. (Applause.)

I shall now present to you the report of J. E. WALLACE WALLIN, Ph.D., the expert psychologist who conducted the mental tests with the Marion school dental squad.

Dr. Ebersole then read Dr. Wallin's report, as follows:

Experimental Oral Hygiene: An Epitome of a Year's Work and an Outlook into the Future.

By J. E. WALLACE WALLIN, Ph.D., School of Education, Univ. Pittsburgh, Pa.

DURING the past year the National Dental Association, through its Committee on Oral Hygiene, has had conducted in Cleveland certain scientific researches into the effects of judicious oral hygiene upon the scholastic, moral, physical, and mental well-being of public school children. This work, unparalleled in the annals of dental public hygienic research, marks a distinct turning-point in the attempt to practically apply the methods of science to the solution of one of the most vital phases of national human conservation. It reflects great credit upon this body of advanced molders of public thought and effort to have sanctioned and aided this scientific movement to arrest pedagogical retardation in the schools and racial degeneration in the nation.

ACCOMPLISHMENTS OF THE ORAL HYGIENE EXPERIMENT IN MARION SCHOOL.

The records of the work thus far accomplished demonstrate: (1) The economic value of rational oral hygiene to

the taxpayer, the community, and the nation; (2) its inestimable value to the individual pupil, the suffering child, in ridding him of an exciting agent of physical pain and disease, of mental stagnation, and moral deviation, and (3) the vast possibilities which the work opens up to the dental profession in the direction of increased usefulness to the community and in the development of a new vocation for school and community experts.

The fruits of the application of oral hygiene to the dental squad in the Marion school may be estimated from the following facts:

(1) In a class of twenty-seven children, most of whom were repeaters—backward children behind grade—only one failure of promotion was reported during the past year. The classroom work showed notable improvement in scholarship.

(2) The record of attendance established by this group during the last year marked a distinct improvement upon the previous year's record. Non-attendance because of toothache and associated ailments, and truancy, were reduced to a satisfactory minimum.

(3) The general attitude, disposition, working habits, and moral behavior of many of the pupils were very materially improved.

(4) The physical condition of the pupils, as shown by general physical appearance, clearness of skin, complexion, and vigor of action, made a distinct improvement.

(5) Most significant, because based on definite serial psychological tests, given under the exacting conditions of scientific control, the mental efficiency of the pupils showed marked improvement. Of the various mental traits measured, the capacity to form such controlled associations as are involved in writing antonyms to a list of supplied words showed the greatest improvement, namely 84.95 per cent. as the average for the entire group. The average gain in the test of the accuracy and speed of perception was 56.21 per cent.; in the spontaneous association test 47 per cent.; in the addition test 38.8 per cent., and in the test of memory span 33.31 per cent. The average gain in all tests amounts to 99.8 per cent. This is a surprisingly large gain. Even if we assume that a part of this improvement can be traced to familiarity, practice, or increasing maturity, the gain demonstrates that, under proper conditions, children who were retarded in their school work are able to make normal progress.

SUGGESTIONS AS TO THE CONTINUATION OF THE ORAL HYGIENE WORK ON A LARGER SCALE.

Does the association feel satisfied to rest its labors with this record of achievement? To do so would be most unfortunate. The work accomplished during the past year should be regarded as preliminary, as the entering wedge to a larger attack on this basic phase of the problem of the conservation of our human resources.

What then, briefly, remains to be done? The investigation should be repeated upon another control squad of specially selected children who receive no treatment whatever, and the scope of the investigation should be considerably enlarged. As a minimum the investigation should embrace the following distinct phases: (*a*) Certain thorough-going pedagogical and sociological inquiries; (*b*) certain physiological and medical studies by exact laboratory methods; (*c*) certain anthropometric developmental

measurements by instruments of precision, and (*d*) certain psychological tests designed to register the functional improvement which various mental traits and capacities undergo as a result of treatment, including the tests used during the past year and a larger number of new tests.

In order to carry out this plan of work properly, there must be funds available for securing such apparatus as cannot be borrowed, for printing forms, and for engaging the necessary auxiliary help. At the same time, the work is of such importance, magnitude, and character that it ought to be placed in charge of a competent scientific expert who could devote, during a period of a year or more, his time to the proper direction and development of the work.

THE PROSPECT OF THE ORAL HYGIENE MOVEMENT.

We live in an age of astonishing industrial and commercial accomplishment. We pride ourselves on our industrial progress. But we are inclined to forget that our industrial supremacy ultimately is based on a new science of industrial efficiency which is the direct outcome of the prior work of the laboratory chemist, physicist, or mineralogist. The nation is now rapidly growing conscious of the need of a corresponding science of human efficiency, but the logic of human improvement is just as inevitable as the logic of industrial advance. We cannot hope to attain to our maximal national human efficiency until students of human nature have adopted the laboratory method of the chemist and physicist, and the study of the problems of human improvement and conservation require the development and application of a laboratory technique of their own. During the past year we have labored to make a small contribution toward the development of a new science of experimental dental hygiene, but we have merely crossed the threshold of this new edifice of science. (Applause.)

Dr. EBERSOLE. The next item on the program is one which I am very glad to be able to present to you tonight. I have pleasure in introducing to you the chairman of the Oral Hygiene Committee of the Southern Branch of the National Dental Association, who has given much time and attention to the work, and, I wish to add, has done more in regard to active services and sacrifices than any other of my assistants in the oral hygiene movement. I have pleasure in introducing to you Dr. J. P. Corley, Greensboro, Ala.

Dr. J. P. CORLEY then delivered the following address:

The Progress of the Work during the Past Year.

By J. P. CORLEY, D.D.S., M.D., Sewanee, Tenn.

A DETAILED account of the progress accomplished in the field of oral hygiene during the past year would make a volume of interesting reading even for the disinterested student of economics and sociology, but would be too lengthy for an occasion like this. By addressing the committee's educational and information bureau, maintained at the committee headquarters, No. 800 Schofield building,

Cleveland, Ohio, any desired information can be obtained.

WAYMARKS IN THE PROGRESS OF ORAL HYGIENE.

Beyond giving certain items, I shall call attention to the progress of the work only in a general way. The items are:

The appointment by Dr. Eugene H. Porter, commissioner of health, of two dentists, Dr. W. A. White and Dr. H. L. Wheeler, as lecturers and consultants in the department of Health of New York state.

The passage of a bill by Congress authorizing the appointment of inspectors for schools in the District of Columbia.

The passage of a bill by Congress authorizing the establishment of a corps of dental surgeons in the United States army with rank, pay, and longevity and retirement conditions as first lieutenant. Dr. John S. Marshall, the senior member of the dental corps, was retired as a first lieutenant at once by reason of the age limit, and was recommended by President Taft to the Senate of the United States for retirement as a captain by reason of his honorable civil war record.

The passage of a law by the state of New Jersey authorizing municipalities to appropriate a sum not to exceed five thousand dollars annually toward the support of dental dispensaries for the treatment of the indigent poor.

The appointment by Dr. W. A. Evans, commissioner of health of Chicago, of Dr. F. F. Mott as supervising dental surgeon of the health board of Chicago. The appointment by Hon. Charles S. Osborn, governor of Michigan, of Dr. C. H. Oakman as a member of the Detroit board of heath.

Satisfactory progress on the Forsyth Memorial Dental Infirmary.

The establishment of a dental infirmary by Mrs. Henry Barton Jacobs in Baltimore, Md.

The University of Maryland has established a chair of oral hygiene and dental history, with the full rank of a professor, appointing B. Merrill Hopkinson, M.D., D.D.S.

A competitive examination of candidates for West Point was held, with Dr. Richard Grady of the Naval Academy on the medical board, the teeth being considered as carefully as the eyes and ears.

Noteworthy progress in the Illinois "public press campaign."

Completion of scientific tests made with the Marion school "dental squad."

The passage of a resolution by the National Association of Dental Faculties declaring for the oral inspection of all dental students, the construction of an equipment for educational and demonstrating purposes, and the preparation of a thesis on public dental immunity by all seniors, these three items to carry "greenroom" grades.

The passage of a resolution by the National Association of Dental Examiners declaring for oral inspection of candidates as a part of their examination for state license.

The advent of two dental journals, *Oral Hygiene* and *Oral Health,* and the enlargement of a third, the *Dispensary Record,* devoted exclusively to mouth hygiene matters.

Besides these items, the profession has witnessed the following important innovations since our last annual meeting:

The dental journals, which are the great clearing-houses of the profession, are featuring this work.

Many of the state societies are devoting their second evening session to the public presentation of this cause.

It is estimated that in approximately two hundred municipalities the work has been taken up in a more or less systematic way.

"Dixie" comes forward with the establishment, in Birmingham, Ala., of the three-unit system as advocated by the committee of the National Dental Association—dental inspection of all her white school pupils, illustrated lectures in her schools, and a free dental dispensary.

A number of the best men in the profession are giving free illustrated lectures, and are writing for the journals and the public press.

In fact, the activities of the past two years have far surpassed all that the profession has hitherto witnessed since its birth. This is due primarily to the logical development of the human race and the evolution of the profession from a vocation to a science, but the immediate cause of the sudden fruition was the superhuman activities of the present chairman of your committee.

Great as has been our progress, it is less than one per cent. of what it should have been. Instead of two hundred centers of activity we should have two hundred thousand; instead of twenty public lecturers we should have twenty thousand. Instead of having representatives on one state board of health, we should be represented on all state boards; instead of having federal patronage in the District of Columbia, we should have it in all the states and territories.

SUGGESTIONS FOR THE REORGANIZATION OF THE NATIONAL COMMITTEE ON ORAL HYGIENE.

Two ways lie open before us: The one is to maintain our present lukewarm attitude, which will permit the work to develop gradually in spite of our indifference, the other is to make a whole-souled consecration to the cause, thereby accomplishing in five years what would otherwise be fifty years in coming.

Having been a student of mouth hygiene and its application to the public since my professional début, and being familiar with the situation as it exists throughout the country, I wish to suggest the following plan, which I personally believe would be both practical and effective:

Let the Oral Hygiene Committee consist of five members elected by the National Dental Association. Elect the first committee so that the term of service shall retire one member each year, when his successor shall be elected for a period of five years. Give the committee the privilege of retiring any member at any time by a majority vote and appoint an *ad interim* successor; allow them to elect their own chairman each year, and also to make a change in the chairmanship at any time that it may be the wish of a majority of the committee; authorize them to elect a field secretary, either from their membership or from the association's membership, who shall give up his entire time to work assigned by the committee. The secretary's salary shall be named by the committee, and the funds for salary and expenses shall be raised by the joint activities of the committee and the association in a manner to be hereafter devised.

Make the president of the association and the secretary of the committee *ex-officio* members of the committee.

One effect of the "direct vote" feature would be to inspire the members of the association with more interest in the committee than they have heretofore manifested. It might also encourage men to

qualify in the eyes of the association, whereas under the present system they need be qualified only in the opinion of the Executive Council.

Long-term service would enable a man to do much more efficient work, while the provision for replacing any member at any time when desired by a majority would enable the committee to rid themselves of dead timber or an antagonistic *confrère* at any time. This feature can scarcely be appreciated by those who have not had experience on a committee of this kind. The committee would obviously be better prepared to select the chairman than would any other body, while the "recall" feature would enable them to change the chairman at any time the majority thought desirable.

The civic and economic importance of mouth hygiene has taken such a hold upon the public fancy, and the publicity recently given it by medical and dental teachers has given the work such an impetus that if the National Dental Association is to maintain the lead in featuring this work, it will have to make radical innovations.

A salaried secretary, devoting his entire time, could execute the plans and policies formulated by the committee, visit the various centers of activity, come into personal touch with leaders, catalog methods, collect data, literature, educational exhibition material, and establish a bureau which would be a general clearing-house for the profession. He could keep the profession informed through the journals and circular letters, reach by visit and correspondence a large per centage of state and local societies, inducing them to create auxiliary committees and build up a strong organization whose ramifications would reach the remotest sections of the country.

The committee ought to have sufficient funds to enable them to hold several conferences during the year, and should be paid a *per diem* for the time their committee duties keep them from their practice. It is an injustice to the members of this committee to place them in a situation which renders the success of their work dependent upon services which involve personal sacrifices causing their families and friends to question their sanity.

A man capable of efficiently filling the office of secretary would have to be the best that the profession could afford, and could not be employed for less than from five to ten thousand dollars per year and expenses.

By making the president of the association and the secretary of the committee *ex-officio* members, four members would be required to constitute a quorum, which would be a fairly sure safeguard for the interests of the association.

THE LOUISIANA STATE BOARD OF HEALTH EDUCATIONAL TRAIN CAMPAIGN.

Through the courtesy of the president of the Louisiana State Board of Health, it was my good fortune to spend a week as a guest on board their educational exhibition and inspection train during the past winter.

This train, two coaches of which were loaned by the V. S. & P. R. R. and a living-car donated by the Pullman Co., has visited every parish and almost every town in the state of Louisiana, with a staff of lecturers and demonstrators under the personal supervision and presidency of Oscar Dowling. It is equipped with moving pictures and a stereopticon outfit, anatomical specimens, and a pathological laboratory, and carries literature and demonstration apparatus for

every department of hygiene and sanitation.

It is safe to say that the board of health of Louisiana has accomplished more for community health through this educational health train campaign of a few months than has been done by the combined health agencies of the same state in the last twenty-five years. During my stay on board, the oral hygiene exhibit of the National Dental Association was displayed in the exhibition coaches, and lectures on oral hygiene and dental inspection in the parish schools were added to the regular program. Dr. Dowling stated that his outfit was incomplete without a dental car, and expressed the desire to add a mouth-hygiene car to his equipage. It was his opinion that if the profession would secure the car, equip it with a suitable exhibit and place a demonstrator and lecturer on board, the railroads of the entire country would willingly haul it free of charge.

I believe that if our committee should be reorganized along the lines just suggested, and a properly equipped mouth-hygiene car be put at the disposal of the secretary, an educational program could be executed that would extend the blessings of dental service to treble the numbers who now receive it, and would shortly secure philanthropic and federal patronage which would remove the financial burden from the shoulders of the profession.

In my opinion but two factors are necessary for the fulfilment of our most ambitious dreams—the moral and the financial support of the organized profession. I think I can name a hundred men who, if they could be brought to realize the unlimited possibilities of this scheme, would gladly contribute one hundred dollars each toward its inauguration.

One of the most urgent necessities is an educational equipment for dental offices. A series of models showing typical mouth conditions is indispensable in this connection; your committee has been endeavoring to collect such a series, but with poor success. A prominent orthodontist recently said before a state society that the models displayed in our exhibit were disgusting, and that our committee ought to take a course in model-making, but when this same critic was requested to contribute models to our exhibit he declined, for the reason that the duplication of his models would spoil their color, and the making of original ones would subject his patients to too much inconvenience. I hereby wish to request all orthodontists who are more interested in the education of the public as to the necessity for orthodontic treatment, especially with reference to those factors which enter into the prevention of arch asymmetries, than they are in the color of their models, to offer their services to your committee.

While the country is rich in philanthropists eagerly seeking channels through which to dispense their wealth for the good of humanity, their business perspicacity makes them place their money where it will accomplish the best results.

If the president of the National Dental Association, armed with the data which are now available and those which are in course of preparation, would undertake to prove to the philanthropists that our cause has extraordinary merit and that our profession would intelligently and conscientiously dispose of their funds, it is probable that we could

get a duplicate for every dollar contributed by the profession.

While it is true that surgically clean teeth cannot decay, it is possible that apparently clinically clean teeth may, under rare conditions, do so. However that may be, it cannot be questioned that the publicity given to the civic and economic value of healthful mouth conditions by our educational propaganda will extend dental service to vast numbers who would otherwise not receive it.

In the name of science and humanity let us spread the gospel of clean teeth and good health!

Reports of Subcommittees of the Oral Hygiene Committee.

Following Dr. Corley's address, the reports of subcommittees of the Oral Hygiene Committee were presented, as follows:

STATE AND LOCAL ASSOCIATIONS.

WASHINGTON, D. C., July 1, 1911.

Dr. W. G. EBERSOLE, Chairman N. D. A. Committee on Oral Hygiene.

Dear Sir,—The Committee on State and Local Associations begs leave to report that on the authority of the general committee, this committee has sent letters to all of the associations and societies of the country, soliciting funds to carry on the work of the joint committee. While many responded with encouraging letters, few, if any, gave financial assistance.

As chairman of the Committee on Oral Hygiene of the District of Columbia Dental Society, I was instructed to write a brief treatise on Oral Hygiene, and to present it to the board of education and principals of the District of Columbia public schools. The monograph was accepted; we were permitted to make examinations of the mouths of the pupils, and, as the result of such examinations, the board of education, through the Commissioners, made overtures to Congress for the appointment of two dental supervisors to care for the teeth of the pupils of the schools. Congress made the necessary appropriation, and at the present time examinations of applicants for dental supervisors are being held in this city.

Finally, your committee would state that while there may be some who claim credit for this work in our city, the entire success is due to a liberal-minded board of education and board of Commissioners, who, seeing the necessity for such steps, placed the need before Congress, and caused that body to pass the bill authorizing the appointment of dental practitioners to the work above named.

HENRY C. THOMPSON, *Chairman.*

PUBLIC PRESS AND TEXT-BOOKS.

BALTIMORE, MD., July 1, 1911.

Dr. W. G. EBERSOLE, Chairman N. D. A. Committee on Oral Hygiene.

Dear Doctor,—As chairman of the Committee on Public Press and Text-books, I beg to make the following report:

Your committee has been conservatively active in prosecuting the work assigned, feeling that any recklessness or unguarded action might ultimately bring its service into discredit. It has conducted a voluminous correspondence with men in almost every section who are interested in the subject of oral hygiene, giving information and advice as to methods of procedure. It has prepared and had published in the public press three two-column, unsigned health bulletins dealing with the subject of oral hygiene, the importance of the teeth, and their care. It has prepared for the World Book Co. for publication in its primer on "Hygiene" a chapter on Oral Hygiene.

It has examined the chapters published in books intended for the same use and dealing with the same subject in about twenty-five school physiologies, and is in correspondence with many of the publishers with a view to revision of some of these. Some of them were found adequate, doubtless prepared by or with the advice of our specialists. It has not been thought timely or wise to undertake the publication of a book dealing alone with our special work, though it is hoped that this may be accomplished later. At the suggestion of the chairman of the general committee, our committee has obtained from Dr. Warner, in conjunction with Dr. C. N. Johnson of Illinois, a promise to undertake for the National such a campaign as they are already so successfully conducting for the Illinois State Society, for the publication in the public press throughout the country of

unsigned articles bringing to the attention of the public the value of clean and healthy mouths.

By presenting to the school board of Baltimore evidences of the importance of our work and a record of what is being done elsewhere, our committee has at last convinced them that the children in the public schools are badly in need of dental inspection and attention. Volunteers from the Maryland State Dental Association have done valuable work at the parental school, a school for incorrigible and truant children. They have equipped an office in the school building at their own expense, and out of forty children whose mouths have been put in order not one had ever received any dental attention except extraction. Lectures have been delivered before many of the groups of teachers on methods of teaching oral hygiene in the schools.

Our committee has made no requisition upon the parent committee for funds, which will certainly be necessary if the sphere of our operations is enlarged.

Respectfully submitted,

B. Holly Smith, *Chairman.*

ELEEMOSYNARY INSTITUTIONS AND STATE LEGISLATURES.

Phelps, N. Y., July 1, 1911.

Dr. W. G. Ebersole, Chairman N. D. A. Committee on Oral Hygiene.

Dear Doctor,—No question associated with our profession has attracted more attention during the past year than oral hygiene. It has received the attention of not only the dentist and physician, but has likewise been largely and intelligently considered and studied by those in charge of our educational institutions, and is looked upon as an important addition to the school curriculum.

The fact that following the annual meeting of the New York State Department of Health, held at Buffalo October 6, 1910, the department officials voted unanimously to establish a department of oral hygiene in connection with its health work, gave us the first medical recognition in this country, and established a precedent that will in time be followed by every state in the Union, is significant of its importance, and is a stepping-stone to further recognition of our profession. The work inaugurated by the Health department of New York state has been so generously received by the boards of education and boards of health that, with the present force of lecturers, it is impossible for the Health department to meet the demand for lectures on oral hygiene. While the work is yet in its infancy, the effect of what has been done has already demonstrated what can and will be done through this medium of instructing and educating the school children for whose special benefit this work will be carried on, and it is expected that through this channel of instruction it will educate the coming generation how to prevent, rather than cure. The relation that this subject bears to the general health is beyond comprehension, and it is only through the medium of education that its importance to mankind can be successfully demonstrated. Dr. Eugene H. Porter, commissioner of health of New York state, said to the writer that nothing in his department has been done that has received such commendation and universal approval as has the work now being done under the supervision of the department along the line of oral hygiene.

As is known, at the December 1910 meeting of the state Health department a bureau of oral hygiene was established. Dr. W. A. White of Phelps, N. Y., and Dr. H. L. Wheeler of New York city, were appointed as consultants and lecturers on oral hygiene. These gentlemen, representing our profession, were furnished by the state Health department with such material as they saw fit to select for the introduction and promotion of their work. Suitable slides were selected, and in March they began their work, giving illustrated lectures in the high schools throughout the state. The lecturers, to an extent almost beyond comprehension, were called for from every section of the state. The call was responded to, and the manner in which they have been received by the schools, boards of education, mothers' clubs, etc., furnishes satisfactory evidence that the laity at large are eager for instruction along these lines, and it is anticipated that the lectures will be given this coming winter throughout the entire state. During the past year a large number of free dental clinics has been established in connection with schools, the gift in most instances of philanthropic people, while in other instances full equipments have been furnished by municipal authorities.

Matters are now under consideration, of a legislative nature, which, if brought to a successful issue, will greatly augment the work now under way. The result of the work in New York State is most gratifying.

W. A. White, *Chairman.*

SCHOOLS AND OTHER EDUCATIONAL INSTITUTIONS.

ANNAPOLIS, MD., July 4, 1911.

Dr. W. G. EBERSOLE, Chairman N. D. A. Committee on Oral Hygiene.

Dear Sir,—I have to report for the year's work:

(1) That I addressed a club of boys in Baltimore and had the members sign a pledge to brush their teeth daily.

(2) That I attended a conference of Maryland Oral Hygiene Council, a representative of the Baltimore school board being present. As a result permission has been given to examine and attend to a number of school children in the Baltimore public schools.

(3) That on request I wrote to the United States Senators of Maryland respecting dental examiners for District of Columbia public schools, and got a favorable reply from U. S. Senator John Walker Smith, a member of the District committee. Dental examiners were authorized by Congress.

(4) Correspondence respecting National Health support I referred to you for consideration and action.

(5) I delivered a lecture to medical men before the alumni of the Baltimore Medical College on request of a member of the school board, on "The Cleanliness of the Teeth, the Mouth, and the Throat."

(6) I published in the Naval Academy *Bulletin* an article on "Information Respecting the Care of the Mouth and Teeth."

(7) I have had correspondence with reference to oral hygiene, and have distributed what printed matter I have had at my command.

(8) In the public press I hailed as a move worthy of the closest attention the establishment of a dental infirmary for children in Baltimore by Mrs. Henry Barton Jacobs.

(9) The University of Maryland, Dental Department, has established a course of lectures on oral hygiene and dental history, and I have co-operated with Prof. Merrill Hopkinson—elected to the chair—with literature at my command.

(10) In a competitive examination of young men for West Point Military Academy, I have served on the medical examining board, the teeth being given the same value as the eyes and ears by the surgeons.

RICHARD GRADY, *Chairman.*

Dr. Ebersole next introduced Dr. John S. Marshall, who addressed the meeting as follows:

Dr. MARSHALL. It was my good fortune to receive an invitation from Dr. Ebersole to be present at one of the tests given to the Marion school dental squad, the last one held in May at the close of the school year. I was told that a good many of these children were originally classed as the undesirable children in the school, that many of them were physically unfit, below par in health, and mentally slow. I was asked, with others, to take the test with these children. There were several ladies and gentlemen present with me at that time witnessing these tests, and I assure you that there was not a woman or man present who could cope with these children in that psychological test. I gave up on the third subject. I hope that you will be present tomorrow and witness the test that is to be given, and take it yourselves. Miss O'Neill will give the same test that I saw, and I think when you have seen that and learn of the physical condition of these children one year ago, you will believe that the care of the mouth is one of the most important factors in healthful bodies and bright minds that has ever been considered in our public schools.

I have been connected with the army for the past eleven years, and have been conducting or overseeing the work of the other dental surgeons, and I wish to say that nothing that has been introduced in the United States army for the benefit of our officers and enlisted men has been so gratefully appreciated as the care of their teeth. At one station in San Francisco, where I had the oversight of practically the same men for seven years, the most gratifying results have been produced in the mouths of the men. The majority of them, when they first came to my office, had dirty mouths, and of course

many decayed teeth. As far as I could I filled the teeth and put them in healthy condition, and taught the men oral hygiene. I said to those who came to me with unclean mouths and teeth: "If you have not a tooth-brush, I will excuse you until tomorrow. Get a tooth-brush and brush your teeth carefully and return to me, and I will take care of you." I had also some cards printed and tacked in the waiting room for enlisted men, with mottoes on them, one of these being: CLEAN TEETH DO NOT DECAY. I also had another placard put up, for my own benefit largely: "Please do not ask the dental surgeon to treat your teeth until after you have brushed them." After I had been there six months the condition of the teeth of these men was marvelously improved. When they smiled one could see clean, healthful-looking teeth, and many of them said they had been greatly benefited by my having taught them the value of their teeth and how to care for them.

Dr. EBERSOLE. I am very sorry that we could not have with us this evening and have him address us the father of this movement, Dr. Richard Grady, who presented the original resolution to the National Dental Association authorizing the appointment of the Oral Hygiene Committee.

Dr. Ebersole then declared the meeting adjourned.

THE CLINICS.

Chairman—D. O. M. LeCron, St. Louis, Mo.
Secretary—A. O. Ross, Columbus, Ohio.

GOLD FILLINGS.

Dr. C. E. Bellchamber, Effingham, Ill. "Gold Filling."

This clinic consisted in filling a mesial cavity in an upper central incisor, using Williams' cohesive-gold cylinders for the greater portion of the filling, and finishing with Watt's crystal gold and platinum. The cavity was prepared according to the Black method. The filling was finished in the usual manner with stones, strips, and trimmers.

Concerted Gold Filling Clinic.

A few brief details are necessary for an understanding of the results of this clinic. Before the introduction of *normal matrices* (the pearl matrices employed inhibiting delivery of abnormal blows), and *identical conditions* (cavities of uniform size being made by a special machine), and of the new *compressed-air test* for non-adaptation, acceptable comparative tests of the merits of the various methods of condensing gold had

Actual time in minutes and seconds.	Actual specific gravity.	Operators.	Time.	Margins.	Leakage.	Specific gravity.	Total.
		MECHANICAL MALLET.	%	%	%	%	%
12.15	17.44	Dr. E. H. Allen, Freeport, Ill.	94	95	100	100	389
13.00	17.02	Dr. James W. Cormany, Mt. Carroll, Ill. ..	91	95	90	95	371
16.45	17.32	Dr. Charles Southwell, Milwaukee, Wis. .	82	100	85	100	367
		Average of mechanical mallet team...					375.66
		HAND MALLET.					
16.00	17.04	Dr. J. B. Pherrin, Des Moines, Ia.	82	100	95	100	377
10.00	17.52	Dr. J. V. Conzett, Dubuque, Ia.	100	95	80	100	375
18.10	17.28	Dr. Perry B. Clark, Columbus, Ohio.	76	100	95	100	371
14.30	16.66	Dr. E. P. Dameron, St. Louis, Mo.	88	95	95	90	368
		Average of hand mallet team.....					372.75

not been possible, and until the introduction of these concerted clinics, comparisons had not been reduced to exact figures.

This clinic was limited to the use of the hand mallet and the Bonwill mechanical mallet, the results being in favor of the latter method by a margin of less than three points.

The judges were Dr. C. P. Pruyn, Chicago; Dr. J. A. Libbey, Pittsburgh; Dr. J. R. Callahan, Cincinnati.

Presuming that the items of margins, time, and specific gravity as shown in the table, are readily understood, all details are omitted except those regarding leakage. The pressure was gradually raised to, but not beyond, 60 lb., the results obtained being as follows:

ALLEN. No leakage at 60 lb.

CLARK. Slight leakage through gold at 59 lb.

PHERRIN. One marginal leakage at 55 lb., another at 60 lb.

DAMERON. One small marginal leakage at 50 lb.

CORMANY. One small marginal leakage at 44 lb.

SOUTHWELL. One small marginal leakage at 36 lb.

CONZETT. Two leakages through gold at 22 lb. Two marginal leakages at 36 lb. Four additional marginal leakages at 50 lb.

CASTING METHODS.

Dr. W. E. FRIBLEY, Chicago, Ill. "Root Restoration, Using Bohr Inlay Metal as a Basis."

The clinician first recommended the removal of the gum tissue by the use of trichloracetic acid. In case the root should require treatment, he uses a pure silver band of No. 32 gage as a matrix to support the root while under treatment. After the root is restored to a healthy condition, it is prepared for an impression. An iridio-platinum pin is placed in the root, and an impression in wax is made with the pin in position. This is then invested, the wax burned out, and the investment allowed to cool before the metal is cast, being careful not to allow the latter to become too hot. The cast inlay is then cemented to place in the root, and the restoration completed in any manner desired.

Dr. N. G. BOWBEER, Wyandotte, Mich. "Cast Inlays in the Deciduous Teeth."

The clinician exhibited a case of a boy of five years of age, in whose mouth he had placed nine cast gold inlays in the eight deciduous molars.

Dr. J. P. MARSHALL, Maplewood, Mo. "Manipulation of Gold in Dentistry and Jewelry."

This clinic consisted of an exhibit of jewelry, crowns, bridges, inlays, reproductions of natural leaves, insects, etc., explaining the methods used in making the various specimens exhibited.

Dr. C. H. HEBBLE, Columbus, Ohio. "Preparation of Cavities for Cast Inlays."

Dr. Hebble exhibited models, in which cavities had been prepared as follows: Step cavity—mesio-incisal—in an upper left central incisor, cervical cavity in an upper canine, approximo-occlusal step cavity in an upper second bicuspid, approximo-occlusal step cavity in an upper first molar, occlusal cavity in an upper first molar, approximo-occlusal cavity in a lower first bicuspid, and an approximal cavity, lingual approach, in an upper lateral incisor.

Dr. C. S. STARKWEATHER, Bellaire, Ohio. "A Simple and Reliable Casting Outfit."

This casting device consists of a large

bicycle pump, with the valve reversed so that it will produce suction when the handle is drawn up. The short tubing from the pump is removed, and replaced by a piece of tubing about three feet in length. A common clay pipe is used to invest the pattern in. Before placing the investment in the pipe, the opening at the stem is covered with a small quantity of asbestos fiber to prevent the investment material from filling the opening. After investing the wax model, the investment is dried out as in any other casting appliance. The pipe is then held in position with the bowl up, and the end of the rubber tubing is fitted over the stem portion of the pipe. The gold is melted in the crucible in the investment in the bowl, and, when it is sufficiently molten, the pump handle is drawn up, forcing the gold readily to place. The accompanying illustration gives an idea of the appearance of the completed casting outfit.

Dr. W. J. Boydston, Fairmont, W. Va. "How to Cast an Inlay When Your Casting Machine is Out of Order."

A piece of brass piping, from six to eight inches long and one and one-half inches in diameter, is secured and filled with plaster of Paris to within two inches of the top. The space left is then filled with soft putty or moldine, and over this are folded about six thicknesses of tissue paper. The investment is then heated and the gold melted to a white heat. The tube, containing the soft putty covered with the moist tissue paper, is brought directly over the investment, and about six or seven pounds pressure brought to bear on the investment, when the gold will be forced to place.

Dr. Otto J. Fruth, St. Louis, Mo. "Method of Making a Hollow Gold Inlay."

The cavity is prepared and a wax impression taken as for an ordinary cast inlay. After the wax model has been properly attached to a sprue wire, it is ready to be hollowed out. This is done by means of a Roach suction wax-carver. The advantages claimed for the hollow inlay are: (1) Better anchorage is obtained for the cement, (2) a larger bulk of cement can be placed over the pulp of the tooth, thereby preventing shock from sudden thermal changes, and (3) a great deal of gold is saved, as the bulk of gold in some cases is reduced at least fifty per cent.

Dr. William Mullin, LaGrange, Ill. "Method of Manipulating the Wax Model in Inlay Work."

A fine Swiss saw, such as is used in the laboratory, may be made very useful in manipulating the wax model after it has been carved and polished prior to removal from the cavity. A piece of the saw, three-quarters of an inch in length, is first heated in a flame and inserted into the model. The wax will flow around the teeth of the saw and afford a retention by means of which the model

can easily be handled. A hollow sprue, made from a hypodermic needle, may then be placed over the saw, the saw is removed, and the wax model is ready for being invested.

Dr. Henry Barnes, Cleveland, Ohio. "Pure Gold Matrix Inlay, Using Ney's Soft Foil and Sweating 22-Karat Gold Plate, Without Investment."

A piece of Ney's or some other semi-cohesive gold is rolled into a ball, pressed into the cavity, and molded to place with a suitably pointed orange-wood stick. When the proper form is obtained, the gold is removed from the cavity, placed on a charcoal block, and without painting, investing, or fluxing, 22-karat gold plate is sweated into the mass, care being taken to place the gold in the center of the inlay. This is continued until the mass is solid. Next a mat of semi-cohesive gold is placed on the cavity side of the inlay, the inlay placed in the cavity, and malleted to place. The surplus margin of gold is then turned over upon the inlay and burnished to place. The inlay is removed from the cavity, placed upon the charcoal block, and again sweated, after which little finishing will be necessary. This method is also applicable to the making of crowns, bridges, etc.

Dr. J. M. Crosby, Bradford, Pa. (I.) "Cast Anchorage for Anterior Teeth." (II.) "Restoration of a Fractured Root."

(I.) The following method of bridging anterior teeth, without displaying any gold and without destroying the pulps of the teeth to which the bridge is attached, has been very helpful to the clinician: Sufficient enamel is removed from the lingual surfaces of two adjoining teeth to allow the use of two plates of gold strong enough to resist attrition. Parallel holes are then drilled through the gold plate and into the teeth, and pins are fitted into the holes. The pins are then threaded to afford additional attachment for cement. The pins and plates of gold are placed in position in the mouth, and wax patterns made and trimmed to proper articulation, and cast in the usual manner. These anchorages are then placed in the mouth, the impression and bite are taken, and the bridge is finished in the usual manner.

(II.) The fractured portion of the root is removed, a cavity is drilled in the outer surface with the How anchor drill, and German silver screw wire is inserted as a handle for the fractured portion of the root. This is then oiled and invested in plaster, in order to obtain an impression of the fractured portion of the tooth. This is then removed, and Tenax wax molded into the plaster impression, trimmed to proper contour, removed, and cast. This casting is placed in the mouth, the crown post inserted and waxed to the inlay made, after which the whole is removed, invested, and soldered. The case can then be treated like a Richmond crown, or a half-band for the lingual surface of the root can be cast to the crown post and inlay restoration.

ORTHODONTIA.

Dr. J. H. McClure, Wheeling, W. Va. "Regulating Appliance."

This clinic consisted in the demonstration of a device for moving into proper position one of the six upper anterior teeth which may occlude inside of the lower arch. This appliance consists of a band fitted around the tooth to be moved, to which a gold strap is soldered. A

short piece of watch-spring or clasp metal is then placed through the strap of gold, the ends resting on the adjoining teeth, thereby exerting traction on the tooth to be moved. If a single piece of watch-spring does not afford sufficient force, several layers of it may be used. The points of advantage claimed for this device are (1) its simplicity and (2) absolute freedom from any inconvenience to the patient.

Dr. M. F. Finley, Washington, D. C. "Orthodontia Models."

This clinic consisted in the exhibit of a number of models of cases which had been treated according to the Jackson system. Dr. Finley showed a case of distal occlusion which had been caused by the non-eruption of the four first bicuspids, and an X ray showing the absence of the germs of these teeth. The occlusion was corrected by means of a plate with an inclined plane. The clinician also showed an X ray of a central incisor which had been fractured in the alveolar socket.

Dr. V. H. Jackson, New York. "Orthodontia."

Dr. Jackson demonstrated his method of equalizing the dental arches, and describing the action of the apparatus used for this purpose, which could be easily removed from the mouth by the patient. The clinician also showed a number of models with appliances in position showing his method of expansion and contraction of the dental arches.

Dr. Jackson also demonstrated the use of the tracing-card, by means of which he could accurately record the measurements and regulate the appliance so as to obtain any amount of force desired.

ORAL SURGERY, TREATMENT OF PYORRHEA ALVEOLARIS, ORAL PROPHYLAXIS, ETC.

Dr. C. P. Wood, Detroit, Mich. "Treatment of Pyorrhea; Exhibiting Cases Cured."

This clinic consisted in the treatment of a case of pyorrhea and the exhibition of a case which had been completed, showing the clinician's method of retaining loosened teeth by means of bridges and splints. The clinician claimed that he had not met with a case of pyorrhea which could not be cured entirely by local means, provided that the unattached surfaces could be kept clean and the roots of loosened teeth made firm in their sockets by means of bridges or splints.

Dr. J. O. McCall, Buffalo, N. Y. "Oral Prophylaxis and Pyorrhea."

Dr. McCall demonstrated the removal of visible deposits with ordinary scalers, following this operation by going under the gum margin and into the pockets, and scaling and polishing the teeth with the Carr pyorrhea instruments. The clinician also demonstrated his method of practicing oral prophylaxis, which consisted in the removal of deposits from the teeth, the grinding off of rough portions of teeth and fillings, after which the teeth were highly polished by means of strips, wood points, and engine polishers, and the patient was instructed in the care of the mouth.

Dr. M. A. Kendrick, Port Huron, Mich. "The Use of Dental Splints in Pyorrhea Cases."

This clinic consisted in the demonstration of the use of a splint for holding loosened teeth firmly in cases of pyorrhea alveolaris. The clinician suggested that by the use of such a splint as described

below, two loosened teeth may be held firmly by fastening them to one firm tooth by means of the splint. The attachments for the splint are, for instance, in the case of a lower canine, the lateral and the central incisor: For the canine, an inlay with a pin in the root-canal; for the lateral incisor, an inlay with pins on each side of the pulp to strengthen the attachment; for the central incisor, a Carmichael crown reinforced with a short pin in the root-canal. These three attachments are then joined together in the form of a splint.

Dr. J. H. Hood, Oil City, Pa. "Mechanical Treatment for Pyorrhea Alveolaris, with the Carr Instruments."

This clinic consisted in the demonstration of the clinician's method of instrumentation and treatment of teeth in cases of pyorrhea alveolaris. The instrumentation was done with the Carr instruments. After instrumentation, the teeth are thoroughly polished with flour of pumice and phénol sodique with the aid of a prophylactic polisher, followed by the use of Cutter's silk tape, moistened with the pumice and phénol sodique; for the final polish, silex is used. The pus pockets are then thoroughly washed out with warm water and treated with phenol-sulfonic acid. Before the acid is used, however, the clinician recommends the use of shellac on the necks of the teeth to prevent the sensitive condition which results from the use of the acid.

Dr. W. J. Charters, Des Moines, Iowa. "Pyorrhea, Using Good's Selection of Younger's Instruments."

The clinician claimed that it was necessary in the treatment of pyorrhea to remove first all deposits, and then to remove a portion of the alveolar process because of the liability of a small amount of deposit being present on the alveolar surfaces. After such instrumentation the pus pockets are thoroughly syringed with lactic acid, and all loosened teeth are ligated.

Dr. W. O. Campbell, St. Louis, Mo. "Fountain Tooth-brush."

Dr. Campbell showed an arrangement for the proper cleansing of the teeth, which consisted of a tooth-brush with perforations in the back. A tube connecting the brush with an antiseptic container conveys the antiseptic to the body of the brush, and by means of the openings in the back of the brush the fluid is delivered at the base of the bristles, whence by capillary attraction it is drawn to their points and is thus conveyed to the teeth and gums. The clinician recommended the use of this device as an aid in the treatment of pyorrhea, because the antiseptic is deposited where it is most needed. He also claimed that it was an efficient means of maintaining oral hygiene, furnishing a bountiful supply of cleansing fluid.

Dr. J. H. Kelsey, Erie, Pa. "Oral Prophylactic Treatment."

This clinic consisted in the demonstration of the clinician's method of monthly treatment in prophylactic work, as follows: The operator's hands are thoroughly cleansed and rendered sterile by sprinkling on them pure alcohol to which has been added a sufficient amount of some aromatic toilet water to counteract the odor of the alcohol. The work is done entirely by hand, the dental engine being used in this treatment only for the purpose of removing and polishing rough edges of fillings. All solid deposits and bacterial accumulations are removed by instrumentation. All the surfaces of the teeth, particularly the necks, are thor-

oughly polished with flour of pumice and phénol sodique carried on orange-wood sticks and points of suitable sizes. Porte-polishers of different angles are used to hold the orange-wood points. All stains and plaques are removed, and the entire oral cavity is rendered sterile in every respect. Various medicines and sprays were used and described. The clinician also called attention to the fact that oral prophylaxis consists not only in the monthly treatments as described above, but also in the restoration of the contact points between teeth and bridge work constructed with mechanical correctness and on hygienic principles. The clinician also called attention to the necessity of instructing the patient in the home treatment of the mouth and teeth, and showed a number of tooth-brushes of various forms, suggesting the shapes he considered most efficient.

Dr. Gillette Hayden, Columbus, Ohio. "Pyorrhea Cases."

This clinic consisted in the exhibition of two cases of pyorrhea which had been treated two years previously, and which were maintained in a healthy state by means of prophylactic treatment.

Dr. Alice M. Steeves, Boston, Mass. "Oral Hygiene."

Dr. Steeves exhibited a number of models showing a common condition of the mouths of children who were compelled to live in congested districts of large cities. These conditions are not confined to any particular race, but demonstrate the very great importance of educating both the profession and the laity to the necessity of meeting these conditions, and also the importance of systematizing the efforts of the profession as well as the laity to overcome them. She suggested that a uniform law making it compulsory that these mouths should be kept in proper condition, like the law which compels all children to attend school, would be a means to this end. In a large majority of these cases, as she claimed, the neglect of the mouth is not entirely due to the poverty of the people, but as much to their shiftlessness and ignorance. Dr. Steeves recommended the teaching of this subject in the schools, and suggested the establishment of dental clinics in connection therewith; these, if properly conducted, could be made self-supporting. Free dentistry as a wholesale commodity, she claimed, is impossible, and the difficulty would have to be met in another way. At the present time, with the number of cases of malnutrition caused by unhygienic conditions, together with overwork in school and out of school, a generation of weaklings is produced, and unless decisive steps are taken in the right direction to combat these conditions, the next generation will be considerably below par physically.

Dr. I. N. Carr, Durham, N. C. "Chronic Abscesses."

This clinic consisted in the treatment of chronic abscesses of the anterior teeth by extracting the teeth, then amputating the root to a point as far as the pericementum had been destroyed, after which the teeth are replanted and held in position by means of a splint cemented to the adjoining teeth.

Dr. A. E. Smith, Pittsburg, Kans. "Prolonged Anesthesia Produced by Nitrous Oxid and Oxygen."

This clinic consisted in the administration of nitrous oxid and oxygen to three patients, as follows: (1) To a patient for the preparation of a hypersensitive cavity for a gold filling; duration of an-

esthesia between twenty and thirty minutes. (2) Removal of a pulp; duration of anesthesia five minutes. (3) Removal of a pulp and the preparation of a cavity; duration of anesthesia fifteen minutes. During the administration of the anesthetic the clinician explained the different stages of anesthesia, its duration, dangers, symptoms, the efficiency of its use in operative dentistry and surgical operations, also the proper technique and office management of patients.

Dr. W. H. DeFord, Des Moines, Iowa. "Anesthetic Inhaler."

Dr. DeFord demonstrated the use of the Stark anesthetic inhaler, showing its uses for somnoform alone and in sequence with ether and chloroform, for cavity preparation, removal of pulps, shaping of the crowns of vital teeth for crowning, and for general surgical purposes.

Dr. Joseph Tichy, Chicago, Ill. "Treatment of Putrescent Pulp-canals with Sodium and Potassium."

This clinic consisted in the demonstration of the treatment of putrescent pulp-canals by the use of sodium and potassium in connection with tricresol and formalin.

The first step in this treatment consists in removing all putrescent odors by the use of tricresol and formalin. The decomposed matter which remains in the canals can then be readily removed by the action of sodium and potassium, which converts the decomposed matter of the canals into soap. This can then be readily removed by syringing the canals with warm water. Dr. Rhein recommends a further sterilization of the canal with a 1:500 solution of mercury bichlorid in a 3 per cent. solution of hydrogen dioxid. Thus it will be seen that the contents of the canal are chemically changed and physically removed, leaving the canal as white and clean as though it had been scrubbed with a brush.

Sodium and potassium has a great affinity for moisture, and should be used with care about the patient's mouth. The few minute particles of the sodium and potassium which will cling to the point of a platinum broach are sufficient to be worked into the canal at one time. This should be repeated again and again, until a suds-like appearance is noticed; then it should be carefully washed out with hot water. Care should be taken not to force any of the contents through the apical foramen, as it may cause pericemental inflammation.

Following this, the canals should be thoroughly dried with warm air, and, making use of capillary attraction, a saturated solution of hydronaphthol and alcohol introduced, this part of the operation requiring from ten to fifteen minutes. The root-canals are then dried out and filled permanently.

Dr. D. H. Young, Attica, N. Y. "The Treatment of Dental Abscesses by Atmospheric Pressure."

This method is simple, scientific, and efficient for treating a dental abscess at any stage.

The end of the abscess-pump makes an airtight union with an opening in the tooth which communicates with the pulp chamber and root-canals. After this connection is made, if the case in hand is one of incipient abscess, the plunger of the abscess-pump is moved so as to create a vacuum in the tooth. This will cause the putrescent matter at the ends of the roots to flow back into the tooth whence it came, and when this, the cause of the abscess, is removed, nature will promptly start the healing process.

In the case of fistulous abscess the plunger is moved so as to force the contents out through the fistula.

Dr. E. F. Loeffler, Ann Arbor, Mich. "A Practical Demonstration of the Use of the Ether Spray for Desensitizing Hypersensitive Dentin."

The prevention or the relief of pain is recognized by many prominent dentists as one of the most important questions before the profession today. The clinician's experience in the use of the ether spray for obtunding hypersensitive dentin, both in private practice and in college clinics, has been very satisfactory and has extended over a period of more than three years. By this method the most sensitive teeth can be excavated, ground down for crowning, the pulp exposed and even extirpated without any pain to the patient. The ether spray is in his opinion by far the most reliable and practical agent for the prevention of pain in nearly all operations upon the teeth. The action of the ether upon the pulp tissue is purely physical, consisting in a lowering of the temperature, but not to the extent of producing harm. The secret of success in the use of this agent depends to a great degree upon the careful manipulation of the spray with a suitable apparatus by which the effect of the ether is produced gradually. The clinician claimed that in no instance has any injury from the use of the ether spray in dental pulps been noted.

Dr. Charles E. Smith, Akron, Ohio. "Excavating Sensitive Cavities, Using Nitrous Oxid and Oxygen."

In the case demonstrated, analgesia was produced in about one minute, and maintained for half an hour, during which time two cavities in the anterior teeth were prepared for filling.

Dr. J. P. Henahan, Cleveland, Ohio. "Nitrous Oxid and Oxygen for Extracting."

This clinic consisted in the administration of nitrous oxid and oxygen, by means of the nasal inhaler, to quite a number of patients in whom various numbers of teeth were extracted. During the administration the clinician explained his method of technique in administering, and also the proportion of nitrous oxid and oxygen to be administered under varying conditions.

Dr. C. K. Teter and Dr. J. H. Lenker, Cleveland. "Prolonged Anesthesia with Nitrous Oxid and Oxygen Administered Through the Nose for the Removal of Tonsils and Adenoids."

This clinic consisted in the administration of nitrous oxid and oxygen through the nasal inhaler in eight cases for the enucleation of tonsils and the removal of adenoids. The gases were administered in a warm state and under pressure, and the anesthesia was maintained during the entire operation in each case.

Dr. E. S. Braithwaite, Chicago, Ohio. "The Mechanical and Surgical Treatment of Congenital Cleft Palate, Demonstrated with Models."

The clinician stated that the object of his clinic was to demonstrate by means of models the desirability of surgical treatment for the relief of congenital cleft palate in preference to attempts at relief by mechanical means. He gave as the reasons for this conclusion the following: (1) By surgical treatment normal conditions are restored. (2) Irritation from a mechanical appliance, which may cause inflammation, is eradicated. (3) The closing of the Eustachian tubes caused by the atrophied palatal muscles from nonuse is avoided. (4) Affection of the

hearing is eliminated. (5) Relief from fatigue caused by an abnormal strain from continued speech, also (6) from the constant annoyance caused by the continual presence of a mechanical appliance is obtained. The clinician showed models of a case which had been under treatment by mechanical means during some fifteen years, and which was then operated upon, the patient being dismissed from the hospital within twelve days, in a perfectly healthy state.

Dr. H. J. Kauffer, New York, N. Y. "Method of Promoting More Favorable Prognostications for Staphylorrhaphy by the Use of Hyperemia, Induced by Suction Plates."

The plate is made in two parts, the upper being a piece of silver plate made to rest on the floor of the nose, and held in place by wires extending from it through the cleft, across the roof of the mouth and attached to the teeth. It is lined with soft rubber, and when in place seals the nasal cleft. The lower part is a silver plate which covers the entire roof of the mouth; this is also lined with soft rubber, and held in place by clasps which are attached to the teeth best adapted to support the apparatus. All edges of the cleft must be covered, but great care should be taken not to bring pressure to bear on any of the soft tissue. The space between the two plates represents the cleft, and in the act of swallowing, suction is produced in this chamber, the patient being instructed to assist this by sucking, and in this way hyperemia is induced. Every dentist has noticed how healthy hyperemic tissue fills the air-chamber of an artificial denture. The same principle on a large scale applies to this appliance. The clinician does not promise to approximate the edges of a cleft by this method, but the hyperemia increases the vascularity of the tissue, which is an important factor in cleft-palate operations, as the large percentage of failures are due to poorly nourished tissue.

The splints are cast aluminum cap splints, which extend down over one-half of the body of the tooth and are held in place by cement and wires passed around the neck of a tooth and laced up over the splint from one tooth to the other.

Dr. Alfred Hall, Chicago, Ill. "Extraction with Reference to Special Points of Instrumentation."

The clinician demonstrated by means of models his method of removing impacted lower third molars with the smallest amount of laceration to the tissues. This assures the speedy recovery of the patient, because only a small area is disturbed, and the tissues surrounding the teeth are properly removed, thereby lessening the liability to inflammation and swelling. Cards mounted with natural teeth were shown, illustrating the abnormal formations met with in third molars. These abnormal formations cause considerable difficulty in the removal of these teeth, and result at times in conditions for which the operator is not to be blamed.

Dr. W. A. Buscho, Chicago, Ill. "Pyorrhea."

Dr. Buscho showed a patient suffering from pyorrhea, in whose mouth all the teeth had been previously treated with the exception of two, which were left to show the original condition, and which were treated at his clinic. The treatment consisted in instrumentation and polishing of the teeth, washing out the pockets with sterile water and massaging the gums.

Dr. T. E. Turner, St. Louis, Mo. "A Combination Bridge and Drainage Tube for the Maxillary Sinus."

Dr. Turner demonstrated his method of procedure in a patient suffering from empyema of the antrum. The patient had for several years been under the treatment of a rhinologist, who had decided that it was necessary to provide permanent drainage. The first molar on the affected side was extracted, and the antrum was opened through the alveolus, and a platinum tube inserted. Inlays were then made for the distal surface of the second bicuspid and the mesial surface of the second molar. With the inlays in position, an impression was taken, and a molar crown was carved in wax around the platinum tube and cast to the tube, after which the inlays and the tube were soldered together. A plug or plunger was then made to fit the tube, and a slot was cut in the cast crown between the buccal cusps to prevent the plug from going into the tube too far. A slot was then cut in the side of the plug, and an iridio-platinum spring inserted to hold the plug in its proper position. The platinum tube was then cut just short of the floor of the antrum, and the appliance cemented to place in the mouth. The antrum could then be irrigated whenever necessary, by simply removing the plug from the platinum tube.

Dr. E. Ballard Lodge, Cleveland, Ohio. "The Amputation of the Apical Root End as Treatment in Chronic Alveolar Abscess; Aided by Skiagraphs Made at Same Sitting."

The patient, a young lady of twenty, presented with a chronic dento-alveolar abscess of the lower right central incisor. A fistula was present which had been discharging pus externally for the past seven months. The fistula had opened through the integument beneath the chin, and about one inch posteriorly thereto. A skiagraph taken prior to the operation showed a considerable area of bone resorption about the apex of the root of the lower right central incisor; it also revealed an unsuspected blind abscess at the apex of the left central incisor. This, however, was seen to be entirely independent, and was treated accordingly. The skiagraph also showed that the root of the right central incisor had not been filled, and that it deviated distally to close approximation with the right lateral incisor. The skiagraph further showed that the fistula did not pass through the mandible, but that it had progressed in the line of least resistance to the soft tissues, and favored by gravity. The root apex being situated below the attachment of the genio-hyoid muscle, the pus had found an exit through the skin below the chin.

Operation. Careful prophylactic treatment having been instituted at a previous sitting, the case was ready for surgical treatment. Tincture of iodin was painted over the gum for the sterilization of the part prior to the introduction of the hypodermic needle. Local anesthesia was produced by the injection of about fifteen drops of a one per cent. solution of cocain hydrochlorid and adrenalin chlorid. This was freshly prepared by dropping two one-sixth grain pellets of cocain which contained one three-hundredth of a grain each of adrenalin into thirty-four drops of distilled water, the quantity of the alkaloid injected not exceeding one-sixth of a grain.

When the part was well anesthetized, an incision was made with a lancet over the apical third of the root, being careful to avoid the frenum labii, and cutting

freely to the bone. Another incision was then made, bisecting the first in the form of the letter X. The tissues were then pressed apart to admit a bur, and a No. 2 Schamberg bone-bur, driven by the engine, was passed between the central and lateral, and the root excised. The root was found to be smoothly dressed, and the excised portion was removed with a Watling spoon excavator. The necrosed sinus walls were then carefully curetted with the same instrument, and the cavity irrigated with hydrogen dioxid to remove all root-cuttings, as well as pus and other débris.

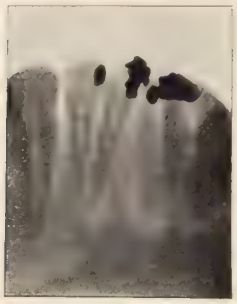
The operation on the bone was then temporarily abandoned, and the abscess below the chin was opened. Gentle pressure was then applied to the parts, causing the evacuation of a considerable amount of pus. Hydrogen dioxid was then forced through the fistula by applying a Sub-Q syringe to that portion of the bone cavity where the excision and curetment had been applied, and a slight evidence of its traversing the fistula was manifest under the chin.

Both wounds were then dressed. The cavity in the bone was packed with a small pledget of iodoform gauze, and the wound on the skin dressed simply with a little aseptic gauze held in place by adhesive tape. The patient was afterward seen daily for a week, during which time recovery was rapid and without incident.

This operation was attended with very little pain, as the patient stated at its completion. The results in an operation of this kind are so satisfactory that the clinician recommended it as a procedure of which dentists should avail themselves more often than is the case at the present time. When the root-canals can be well dried, it is just as well to fill them before the excision of the root. In the case cited above, however, the root was filled after the excision.

The clinician mentioned the fact that the skiagraph in cases of this kind is a very valuable aid, as it gives definite information concerning the extent of the resorption of the bone or root or both, and shows whether apical amputation is indicated.

FIG. 1.



Before operation.

FIG. 2.

After operation.

PORCELAIN.

Dr. C. E. WOODBURY, Council Bluffs, Iowa. "Porcelain Inlay."

Owing to the fact that a suitable patient was not obtainable, an inlay was not made for a practical case. A table

clinic was given, however, showing the mixing and manipulation of Lennox stains for use in altering the shades of artificial teeth and crowns. The colors used are blue black, white, yellow ocher, Venetian red, Assyrian blue, and deep sea-green. They are mixed with glycerin, the colors being blended to produce the shade desired. They are painted on with a brush in the same way as china paints, and fuse true to color, although they are of less intensity than they appear when first applied.

Dr. W. A. Capon, Philadelphia, Pa. "Porcelain Restoration of Incisal Edges."

The broken or irregular surface of the tooth is trimmed so that the enamel edge is square and true. The cavity of the tooth is made as deep as the circumstances will permit, if the pulp is alive; otherwise its depth is regulated by the operator's judgment.

The usual inlay foil is then burnished into this prepared cavity without considering the tearing of the metal at the bottom portion, because this space is occupied by a loop or staple of wire. This staple is made from 24-gage iridio-platinum wire, and inserted into the matrix while it is in position in the cavity. Porcelain in a pasty condition is then pushed into the intervening spaces and packed about the protruding ends of the wire. The excess moisture is removed with bibulous paper or a napkin, so that there will be a minimum change of the united section during the fusing of the porcelain.

This combination is then given a hard biscuit bake, reburnished into the cavity, and contoured with porcelain in the usual manner. After the final baking, the platinum foil is removed and the section cemented into position, thus restoring the tooth to a normal appearance in a practical and durable manner.

Dr. Fred J. Capon, Toronto, Canada. "Porcelain."

The clinician demonstrated the many different uses to which porcelain may be put, including the delicate inlay bicuspid and molar crowns and the continuous gum dentures. The use of the porcelain for continuous-gum work was shown in the different stages from the platinum base-plate to the time when it reached the furnace, the clinician baking a complete practical case. He also showed a sample case upon which were carved teeth and bridges, the base being made of porcelain. The principal object of this clinic was to show the importance that porcelain plays in dental operations.

Dr. Capon also demonstrated his method of making an incisal edge inlay, showing the use of pins and their means of adjustment, and claimed that it was just as important in these cases to maintain the porcelain inlay in position by means of pins or dowels as is the case in gold inlays. The clinician further showed a number of models illustrating porcelain crowns, incisor crowns, post, tube, and jacket crowns, and bicuspid and molar crowns. The bicuspid and molar crowns were of the cup variety, the porcelain being held practically in a matrix to insure strength and utility.

Dr. Willis A. Coston, Topeka, Kans. "Porcelain Jacket Crowns."

This clinic demonstrated the method of making porcelain jacket crowns on models made of silicate cement. The models are made under pressure in the Roach swager, which produces a perfect model for this purpose. All the lines and angles are reproduced perfectly in

the cement. The model produced is very hard, and the platinum matrix may be burnished or swaged over it with little danger of breaking or crushing the model. The porcelain body may be applied while the matrix is in position on the model. The body used for this purpose is S. S. White high-fusing body, fusing at 2560° F.

Dr. Coston also demonstrated his method of adapting the S. S. White countersunk molars and bicuspids for crown and bridge work.

Dr. Harris J. Frank, Chicago, Ill. "Preparation, Manipulation, and Baking of a Porcelain Jacket Crown."

A natural tooth was prepared in the same way as for a gold crown, *i.e.* the entire enamel was removed, leaving the tooth slightly cone-shaped, and then the preparation furthered by cutting a small square shoulder just under the free margin of the gum, entirely around the tooth.

A matrix of 1-1000 platinum was then burnished carefully about the prepared crown of the tooth and shoulder, and the platinum locked on the lingual side with a tinner's joint, after cutting away the excess platinum below the shoulder.

With the matrix in place on the tooth, the construction of the porcelain crown was started by applying a very little porcelain at a time, thoroughly spatulating each application to eliminate all air-bubbles. This was continued until the entire matrix was covered with porcelain. A second layer of porcelain was then applied in the same manner, with the object of obtaining the desired shade, and when all was well spatulated and the porcelain dried, the crown was removed from the root and placed in a furnace. It required about twenty minutes to raise the heat of the furnace up to the fusing-point, 2560° F., when the crown was removed, the result being a beautifully translucent and lifelike tooth.

The porcelain used in this case was that of the S. S. White Dental Mfg. Co. known as the 2560° F. The crown was completed in one baking in an S. S. White furnace.

In order to demonstrate the strength of a tooth constructed in this manner, a similar crown was built on a large spike, cemented on, and driven through a block of wood four inches in thickness.

CROWN AND BRIDGE WORK.

Dr. W. H. Moseley, South Boston, Va. "An Ideal Bicuspid Crown, Made by Using a Porcelain Veneering Over a Gold Shell Crown."

This clinic consisted in the demonstration of a method of using an all-gold crown in the anterior portion of which a countersunk depression is made, into which low-fusing enamel is baked by means of an ordinary blowpipe.

Dr. J. A. Heaton, Hoopeston, Ill. "Removable Band for a Porcelain Crown."

An upper left first bicuspid is ground down to the gum line, the enamel scaled, the root trimmed, and a gold band, as in the Richmond crown, fitted to the root. The crown is then selected and shaped according to the form of the band. When the band is fitted to the crown, the portion of the crown that is to show is beveled to a depth corresponding to the thickness of the gold (32 gage). The band is then placed on the crown and tried on the prepared root. The crown is removed, dried thoroughly, and the band replaced on the crown. The crown, with the band in proper position, is then cemented into place in the mouth.

Dr. E. P. Dameron, St. Louis, Mo. "Diatoric Teeth in Crown and Bridge Work."

This clinic consisted in the demonstration of the various uses of diatoric teeth in making crowns and bridges. The clinician also demonstrated a method of casting hollow all-gold dummies.

Dr. C. W. Benson, Duluth, Minn. "Contouring Two-piece Shell Crowns."

After fitting the band to the properly prepared tooth, the contour is obtained by stretching the metal outwardly without changing the form of the root-end of the band. This is especially indicated in lower molars and bicuspids, as the normal contour, which is most pronounced on the buccal surface, is thus restored. This contour is essential, as it protects the gingiva from the excursion of food over this surface.

Dr. J. J. Travis, Plymouth, Mich. "Gold Bridge, Using the Davis Crown for Anterior and Posterior Positions."

The clinician demonstrated the use of the Davis crown in bridge work, in both anterior and posterior positions, in connection with gold and iridio-platinum.

Dr. A. O. Plant, Wheeling, W. Va. "Combination of Diatoric Tooth and Metal Casting for Restoration of Posterior Teeth."

The tooth to be crowned is trimmed, first, to the gum level, and a diatoric tooth is selected and ground to an approximate fit at the buccal margin. The tooth is then waxed to position as required, after which the casting is made either with or without the porcelain tooth in position. The crown is then finished and cemented to place in the mouth.

Dr. E. M. Carson, St. Louis, Mo. "A Cast Crown."

This clinic consisted in the demonstration of a method of making an anterior crown of the Richmond design, the crown being cast instead of soldered. The root is ground to nearly the gum margin and beveled all around with a No. 1 or No. 2 bur, and slight depressions are made at four points around the dowel opening to prevent the crown from rocking or becoming misplaced. No backing is used upon the porcelain facing, the casting being made directly upon the facing, although a backing may be used if desired. The crown is waxed to position in the patient's mouth immediately after preparation of the root, and the casting proceeded with in the ordinary manner. The clinician showed models illustrating the different steps in the making of this crown, and claimed for his method the following advantages: (1) Speed. (2) A more artistic crown. (3) A better fit is secured by casting than with the Richmond method.

Dr. G. G. Bell, Ashland, Ky. "Grinding and Mounting a Detached-Post Crown."

The enamel is removed from the root in the same way as for a shell crown. A wire measurement is made, and a conical silver tube of 28 gage, is made half the length of the tooth to be used. The tooth is then ground to within two lines of the gum margin and the tube fitted over the root. The tube is then removed, and the root beveled at the buccal margin. Next, the crown is fitted to the tube, and then beveled to correspond with the bevel of the root, after which the crown is cemented to place as in any case where one mix of cement is used.

Dr. J. Gillespie Reid, Marion, N. C. "Some Casting Specialties in Crown and Bridge Work."

This clinic consisted in the demonstration of methods of casting on Logan crowns, and the use of the S. S. White combination sets in crown and bridge work, either gold or Weston's metal being used for casting.

Dr. Reid also demonstrated a method of replacing a broken facing in bridge work, as follows: If one of the six anterior teeth is broken off, the pins, if they still remain, are ground at the point of fracture. The bridge is then ground on the lingual surface sufficiently to allow for a thickness of No. 36-gage pure gold. The gold backing on the bridge is then slit to correspond with the pins in the facing sufficiently far down to allow the facing to go into position, being careful not to weaken the bridge at this point. With the facing in position, a piece of No. 36-gage pure gold is burnished over the lingual surface, down over the incisal edge of the facing, in which holes are made to admit the pins of the facing. With the facing and backing in position, an impression is taken, the piece removed and soldered, after which the crown is cemented to position. Instead of using the gold plate, the facing may be waxed to place with casting wax, removed, and cast in the usual way. The clinician claimed that this was an excellent method of bridge repair, and could be followed in the case of bicuspids as well as anterior teeth, except that in the case of bicuspids it was necessary to cast because of the fact that the pins were not sufficiently long to burnish the gold plate thereto.

Dr. Charles P. Grosby, St. Louis, Mo. "(I.) Preparation of Root for Porcelain Crowns. (II.) Cavity Preparation for Cast Inlay Abutments for Bridge Work."

(I.) The clinician showed several anterior roots, the preparation of which was so made as to eliminate the possibility of splitting them under strain, and to form strong abutments for bridge work. This may be accomplished by beveling the root both labially and lingually from a central point so that the cast base which is to form the base of the crown will straddle the exposed end, overcoming any tendency toward rotation or displacement. The labial end is to extend from

the lingual edge of the root-canal to a point far beneath the gum, and the lingual bevel to extend not quite to the gum line. The basal end of the canal is enlarged to form a step as deep as is consistent with the strength of the remaining edge. A dowel of 14-gage threaded iridio-platinum wire, should be adjusted to fill the enlarged canal closely. The step in the base may be burnished with platinum foil and cast against the platinum lining, or cast directly. Care should be taken that no gold is on the dowel above the step.

(II.) The clinician demonstrated an upper right bridge mounted on an articulated form, the first bicuspid and first molar serving as inlay abutments. The success of this method of attachment depends largely upon the preparation, which consists in a flat base, from which the axial margins should be trimmed at

right angles or slightly diverging toward the periphery. The preparation is made with a view to creating a self-cleansing area, and the enamel walls are well beveled. The attachments are fortified by stout threaded iridio-platinum dowels.

The clinician also demonstrated how to duplicate the natural cusps by taking an impression of the latter in modeling compound. After the softened inlay wax and dowel are in position, the impression is pressed well into place, and the exact duplicate cusps will be formed.

Dr. W. J. Boydston, Fairmont, W. Va. "Method of Making Porcelain-Faced Shell Crowns by the Use of the Steele Facings for Bicuspids."

The tooth is ground in the same manner as for a shell crown, except that the buccal surface is beveled to accommodate the facing. The band is fitted to the root and ground away at the buccal surface, leaving a narrow band at the gingival margin. The cusp is then swaged, waxed to the linguo-occlusal edge of the band, and tried to place to secure proper articulation. The cusp is then soldered and refitted. With the cusp and band in position, the facing is ground to approximate fit. Casting wax is placed on the facing, the facing pressed to place, and the piece removed, trimmed, the sprue inserted, invested, and cast. After the casting is made, the clinician suggested, a small portion of 20-karat solder flowed around the cast and band would prevent any possibility of leakage in the crown.

Dr. C. A. Priest, Marion, Ind. "Lingual or Concealed Anchorage for Anterior Bridges."

Having removed the pulps from the teeth to be used for abutments, cavities are cut on the lingual surfaces to a depth sufficient to allow for the bulk of gold to be used in an inlay abutment. Inlays are then made with posts extending into the root-canal, and extending over the gingivo-lingual portion of the teeth. This, the clinician claimed, would provide a strong concealed anchorage for anterior bridges.

Dr. C. L. Anderson, Tomah, Wis. "A Method for Easily and Accurately Overcoming the Difficulties of Adjusting Bridge Work on Converging Roots."

This clinic consisted in the demonstration of a process by which a bridge may be applied to converging roots accurately and easily, preventing any irregularity of the teeth and producing a perfect alignment and articulation. This method has been described in detail in the *Dental Brief* for June 1911.

Dr. J. E. Dowden, Fairmont, W. Va. "Esthetic Bridge Work."

This clinic consisted in the demonstration of a method of replacing upper incisors by using ordinary methods. Backings are first cast to fit the facings, allowing the backing to extend over the tip of the incisal edge. The facings and backings are then waxed to position, the facings removed, and the abutments and backings invested and soldered with 22-karat solder. The facings may then be placed in position and soldered at the pins, or they may be cemented in position. The clinician claimed that by this method the danger of fracture of the porcelain is reduced to a minimum, and any conspicuous display of gold is avoided.

Dr. S. H. McAfee, New Orleans, La. "High-Fusing Metals in the Initial Steps of Crown and Bridge Work."

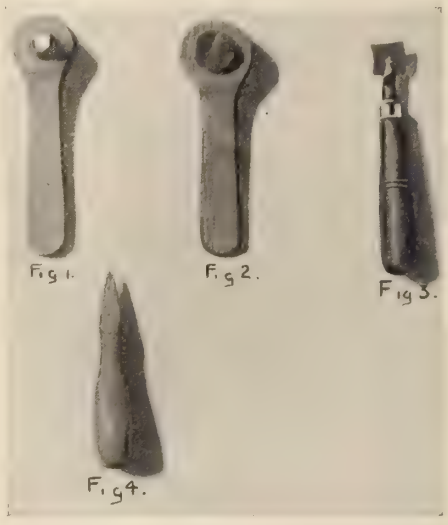
The object of this clinic was to show the use of 3/1000 inch soft platinum, 25

per cent. platinum solder, 22-karat "non-oxidizable" gold, iridio-platinum dowels, etc., in constructing copings, bands, detachable tubular backings, etc., in the first steps of crown and bridge work. The heat used for manipulating these high-fusing metals was produced by an oxyhydrogen blowpipe specially designed by the clinician.

The advantages claimed for the methods shown were greater accuracy of fit, greater precision throughout the different steps, and more positive results in the end. There is no danger of melting the copings, bands, etc., borax or flux being unnecessary, and the body of the crowns and bridges being formed by the casting process.

No originality is claimed for the oxyhydrogen blowpipe employed, except for the combination of the various parts, which insures a quick, steady, and always positive and uniform action of the blowpipe flame, whether the nitrous oxid cylinder be fully charged or nearly empty. The apparatus consists of a yoke for the nitrous oxid cylinders, to which a pressure reducer is closely connected. To this is attached that part of the Mason oxyhydrogen blowpipe which carries the needle valve, hose, and handpiece. On the gas inlet of this part another needle valve is inserted, which regulates the quantity of illuminating gas used. The pressure gage is set to reduce the nitrous oxid; the needle valve set to give the proper amount of nitrous oxid. This is all determined by experiment. After the valves are once regulated to produce the proper flame, no further regulation is necessary except, perhaps, at long intervals. All that is necessary is to open the main supply of illuminating gas, light the flame, then open the main valve of the nitrous oxid cylinder, and at once a steady oxyhydrogen flame is obtained, no heating of the nitrous oxid cylinder head being necessary, and no regulation of the proportions of gas each time the blowpipe is used or during its use in soldering operations.

Dr. D. A. Rosenthal, Pittsburgh, Pa. "A Device for Facilitating the Perfect Adaptation of Backings and Soldering



with the Least Possible Chance of Checking Facings."

This device consists of two wooden instruments (Figs. 1 and 2) with depressions in each for the retention of a rubber cork, one of which is more flexible than the other. By placing the tooth with the pins up on the softer cork (Fig. 2) and pressing the backing into place with the other instrument (Fig. 1) the tooth is encased in a nest of gold, protecting it all around. The pins should not be bent before the tips are soldered, *i.e.* if tips are desired. The pins are run through a piece of rubber dam, and a flat, V-shaped steel instrument is inserted between them. (Fig. 3.) This instrument

is pushed forward while the pins are being bent with a wooden instrument (Fig. 4), this action tending to prevent direct force being brought to bear on the porcelain, which often causes a fracture before the case is even invested.

As an additional safeguard against checking, the facings before investing are painted with a composition consisting of equal parts of powdered asbestos and prepared chalk and a small quantity of plaster of Paris.

Dr. N. W. Hiatt, Marion, Ind. "Removable Bridge."

The clinician claimed that the removable bridge in many cases is preferable to the stationary bridge. For the making of removable bridges, he recommended the use of the Gillmore clasp as being the best he had used. The method of construction is such that the bridge can be made with either a single or double anchorage. When the double pier anchorage is used, the crowns are constructed in the same way as for any bridge abutment by means of impression and models. A clasp metal wire of No. 14 gage is then adjusted to the gum between the crowns, each end of the wire being bent and soldered to the approximal surfaces of the crowns. These extensions of the wire form a groove in the finished piece, which prevents any lateral motion. The clasp is located near the center of the bridge, and is made of clasp gold. Any material desired can be used in the construction of this bridge.

Dr. W. H. Hayden, Youngstown, Ohio. "Casting Bridges, Including Abutments, in a Single Cast."

This operation consists of the molding of casting wax directly to the face of the abutment roots for the construction of a nine-tooth bridge. Embedded within the wax and connected with dowel posts is a bar of iridio-platinum of from 16 to 18 gage, which extends throughout the bridge and gives sufficient rigidity to permit of frequent removal and insertion. The platinum bar also is an aid in waxing the facings to place and properly carving the wax bridge ready for investment. The investment is made in the usual manner, and the bridge completed in a single cast directly against the eight facings, with no apparent shrinkage. The clinician showed a practical case in which a band and cap was first made for each root, owing to the insufficient support afforded otherwise. The advantages of this method, as claimed by the clinician, are a great saving of time, greater accuracy in adjusting the neck of the facing to the bridge, and the fact of seeing the bridge in the mouth exactly as it will be when cemented to place.

Dr. A. W. Jarman, Philadelphia, Pa. "Removable Crown and Bridge Work."

This clinic covered the subject of removable bridge work, laying particular stress upon the preparation of abutments, the use of the telescope cope, and the tube and split pin, showing the need and use of these abutments in the construction of removable bridges of different types.

The clinic included the lengthy explanation and demonstration of the proper application of the casting process to removable bridge work, and its use in making removable saddle bridges for the lower jaw.

A lengthy demonstration was also given with the aim of explaining the necessity of the blowpipe in bridge work. As there are some bridges which can be cast and others which are better when joined with solder, a knowledge of both

methods is necessary to the successful bridge worker.

The three removable bridges exhibited were in a finished state, and furnished evidence of the substantial character and esthetic appearance of this high-grade bridge work. It was the particular aim of the clinician in presenting this clinic to make a plea for high-grade crown and bridge work made of the best materials and in such a manner as to give the patient as nearly a perfect restoration of the lost teeth as possible.

The advantages of removable bridges over fixed bridges are evident to anyone who has seen this work. If, however, the removable parts are not constructed in the proper manner, they will be of very little value to the patient. The removable bridge affords the patient the opportunity of keeping the mouth clean, as the removed bridge can be scrubbed with soap and water, and then replaced in the mouth. Should any little part of the bridge break, it can be repaired by the dentist without destroying the appliance or annoying the patient.

As demonstrated, every means possible is employed for making bridges strong by using gold, particularly on the masticating surface, while porcelain facings are ground and placed in such a manner as to hide the gold from view.

One lower saddle bridge was exhibited, representing a very practical means of restoring lost molars in the lower jaw when there are no teeth posterior to the bicuspids. The conditions necessary for a successful restoration are a well-defined alveolar ridge and two firm bicuspids or one firm canine and one bicuspid for abutments. These teeth as abutments simply hold the saddle in position, as the saddle portion is supported by the alveolar ridge.

The replacing of the missing central was demonstrated by a small removable bridge made by using the remaining central as abutment, placing a small rest in the gold filling in the lateral, the gold being entirely concealed by the porcelain facing. The central abutment was devitalized and a tube and split pin was inserted the entire length of the tooth; then a gold inlay was cast around the tube so as to make a tight filling.

The clinician announced that he would be pleased to answer any questions by anyone interested, regarding the construction of the work exhibited.

Dr. J. L. Kelly, Chicago, Ill. "Removable Bridges."

The attachments of this system of removable bridge consist of a holding post, a retaining tube, and a bridge tube.

The retention of the bridge is obtained by the position or relation of the holding posts to each other. The means of retention is a dovetail obtained by inclining or diverging the holding posts toward or from each other. The degree of retention is modified by the retaining tubes.

The retaining tube telescopes the holding post, and is telescoped by the bridge tube, thereby insuring accurate fit of these parts, which in some cases will be found advantageous.

The holding posts are made of round iridio-platinum wire, varying in size from 14 to 10 gage and in length from 2 to 3 mm., depending on the case. These posts are soldered to the top of copes or to a bar extension.

The retaining tubes also vary in size and take up any unnecessary play between the bridge tubes and the holding

posts, making it possible to place all stress on the ridge when necessary.

The retaining tubes and bridge tubes are made in steel dies and of iridio-platinum. There are twenty sizes, the smallest made to telescope a 14-gage wire, which will fit into the canal of an incisor, and the largest ½ inch in diameter, which will fit over a large molar.

With these attachments it is possible to obtain varying degrees of retention after the bridge is completed, without weakening any part, and also to place the stress where desired, as the roots and abutments are freed from it by leaving off a part of the retaining tubes or a part of each of the bridge tubes.

In cases where pyorrhea has left but few teeth, these may be used, with lasting result, because the stress can be placed as desired.

Dr. Forry R. Getz, New York, N. Y. "Some Utilities for General Practice, with Special Reference to Removable Bridge Work and Interdental Supports."

This clinic was given to show the possibilities and advantages of removable bridge work over fixed bridges and partial plates, in its adaptation to the varied conditions that present, by the employment of modified and special forms of abutment attachments, on either perfectly sound or pyorrheal and loosened teeth. The greater cleanliness rendered possible, the additional support afforded by the saddles in extensive cases, and the absence of absolute and continued fixation of the abutment teeth are much more favorable to the continued service, life, and success of the removable bridge, which represents a nearer approach to natural conditions and natural stress upon the abutments than the conditions that go with fixed bridges in the majority of cases. One case in particular, in which severe pyorrheal conditions had been present, illustrated this feature most forcibly and convincingly, in that a removable bridge endured longer than two fixed bridges in the same mouth, and when the latter were lost the removable appliance served to carry an extension saddle, which took the place of the fixed bridge and its abutment teeth.

Practical cases, duplicates, and models of cases in the mouth were shown. There were also shown three different styles of supports for mechanically uniting, strengthening, and holding in position loosened pyorrheal teeth that have begun to rotate, elongate, or move out of position. These supports were swaged and soldered, cast and soldered, and wholly cast, the employment of either method or the three combined rendering possible a larger range of applications and greater satisfaction for both patient and operator. Models of practical cases were also shown.

PROSTHETIC DENTISTRY. ARTIFICIAL DENTURES.

Dr. G. C. Marlow, Lancaster, Wis. "New Method of Taking a Bite."

This clinic consisted in the demonstration of the use of the Holmes Modern Bite Tray for taking a bite. The principal feature of the bite tray is its value in obtaining the proper relation of the jaws to each other.

Dr. C. W. Myers, Montpelier, Ohio. "An Elastic Banded Impression Tray."

This clinic consisted in the demonstration of a method of taking an impression of the upper jaw with the aid of an elastic band around the impression tray. The band is so applied that it prevents

the plaster from pushing back on to the soft palate while taking the impression.

Dr. G. E. Bishop, Cleveland, Ohio. "The Correct Mechanical Principles Involved in Making Clasps for Partial Plates or Removable Bridge Retention."

In the making of clasps for partial plates or removable bridge retention, the clinician emphasized the importance of having the clasp extend over the three angles of the tooth for which the clasp is made. These three angles should be the anterior lingual, the posterior lingual, and the posterior labial. The lingual angles, by comparison, are much smaller than the labial one. The extension of the clasp around the anterior lingual angle is reinforced and without any spring, while the end, extending over the posterior labial angle, is the only portion of the clasp that should have any spring in it. The extension over this posterior labial angle should come to a point just over the bulge of the angle. Clamps constructed in this fashion are easily made to fit perfectly about the natural tooth, and can be placed in position with the minimum amount of spring in the clasp itself. Less wear on the tooth is the result, and perfect retention is obtained.

Dr. E. W. Martindale, Columbus, Ohio. "Cast Anchor Plate; Bauman Method."

After selecting the teeth to which the plate is to be anchored, and ascertaining that they are the proper distance apart to insure the best attachment, the teeth are prepared as for Richmond crowns, allowing the post to extend a little higher than the cap. An impression is then taken with plaster, a model made, and an iridio-platinum bar soldered to the caps. This is placed in the mouth, a second impression is taken, a model made, and waxed up as desired for either rubber attachment or for casting to the teeth, after which the case is invested, and cast by any method desired.

Dr. C. H. Woolgar, Clyde, Ohio. "Bridge Impression Tray for Taking a Bite and Impression Simultaneously in Plaster of Paris."

The tray consists of removable sides, one side being extended to serve as a handle. The two sides are held together by means of a bolt, and a tube fitting over the bolt holds the two sides the proper distance apart. When an impression for a bridge is to be taken, the space between the sides of the tray is filled level full with plaster of Paris, carried to the mouth, and the plaster forced over the bridge abutments, including one or more teeth beyond the abutments. The patient is then instructed to close the teeth to normal occlusion, and when the plaster has hardened the patient opens the mouth, separating one jaw from the impression. The impression is then removed, stained, and plaster poured into each side of the impression, except that on the side of the abutments some material is mixed with the plaster which will enable it to withstand the heat in soldering. The two models are fastened to the articulator at the time of pouring the models. Next the sides of the tray are removed, and with the point of a knife-blade the plaster is prized from around the end of the tube that passes through the impression; the tube is then taken out by carefully twisting it with a pair of pliers. The remainder of the impression is then removed, when the two models will be left on the articulator in perfectly normal occlusion. While any articulator can be used for this purpose, one with long arms and short bows is recom-

mended, as it permits the operator to remove the models and impression from the articulator at the time of cutting away the impression from the models. The advantage of this method as claimed by the essayist is that it gives absolute accuracy in the construction of bridges, and is very easily fitted to the mouth.

Dr. S. C. G. Watkins, Montclair, N. J. "Technique of Various Steps in the Construction of Artificial Dentures."

The clinician demonstrated his method of making artificial dentures, as follows:

He described his method of taking impressions for full dentures by first taking the impression with wax, then pressing away or cutting out the wax so as to leave some space. Then plaster is placed into the wax impression, which makes a good impression cup, the plaster is carried to the mouth and pressed home firmly. The wax impression cup forces the plaster directly against the tissues, so that a perfect impression results.

The impression for a partial denture is first taken with wax in the same way as for a full set; the wax impression is removed, and the wax in the wax impression cut away from around the teeth. Then a strip of pink base-plate wax is cut, placed in warm water to soften it, molded carefully around all remaining teeth in the mouth, and the patient is warned to keep the mouth open so as not to distort the base-plate wax. Plaster is then mixed quite soft, poured into the wax impression, and carried home firmly in the mouth. When it is thoroughly hard it can be removed by giving it a little motion and breaking the connection between the wax and the teeth. The wax will give sufficiently to allow the impression to come away without being broken to pieces. The result is a perfect impression of the roof of the mouth, and any disfigurement or distortion around the teeth can easily be remedied by carving the teeth. The plaster model is then cast, and when hard is trimmed thoroughly. The model will be scraped all over so as to allow for a thickness of tin foil. Wherever there is any soft tissue in the roof of the mouth, the model is scraped very heavily, making a deep groove across the back of the model, also around the sides of the roof of the mouth, just outside of where an air-chamber would be placed if one were to be used, bearing in mind that the rugæ are not scraped away, although scraping is applied between the rugæ. When there is any very hard bony portion in the mouth, it is not to be scraped away, but in such cases, where this tissue is extremely hard, one, two, three, or four thicknesses of No. 60 tin foil are placed over it so as to secure relief. The purpose of scraping is that when the plate is made, it will press very hard upon all soft parts, forcing the soft tissue against the bone, with the result that the plate will have an exact and solid bearing upon every portion, without any rocking or wabbling, and a perfect suction.

After the model is scraped the entire model is covered with No. 60 tin foil, which is burnished into all uneven places. The model is covered with fairly stiff shellac varnish, and before this is dry the tin foil is placed on and burnished to the model so that it is fairly a part of the latter, fitting so closely that it really adds very little thickness to it. The base-plate is then applied and stiffened with iron wire, which is run around the ridge, and in two or three places across the plate, so that the articulation can be taken without warping or distorting the base-plate at all. When the articulation is taken,

the base-plate can be placed back upon the model, which it will fit perfectly.

The teeth are then selected in regard to color, shape, and general conformity to the features, contour, and complexion of the face, always bearing in mind that in the natural mouth the teeth are not all of the same shade. It is therefore necessary to choose teeth from more than one set. The clinician in making a denture rarely, if ever, uses only one set, but selects teeth from two, three, or four sets, in order to secure the proper expression and to impart to the patient's face when laughing and showing his teeth an absolutely natural appearance without any suspicion of his wearing an artificial denture. In cases where the natural teeth have been irregular, the artificial teeth should not be set up regularly, but with a slight suggestion of their original irregularity. In pyorrheal patients the teeth have a straggling appearance. When such a patient finally requires a plate, the teeth should be so arranged that they do not change the patient's face, but give a faint suggestion of the trouble which existed, so that the patient makes the impression of having had the teeth treated and improved.

When the teeth are all set up in the right position, oxyphosphate cement should be placed between them to prevent the rubber from invading the interproximal spaces, in this way preserving for each tooth its own individuality. All of the palatal surface of the base-plate is then removed with a wax spoon by simply cutting it just inside the teeth, and in its stead a single sheet of pink base-plate wax, softened in warm water, is molded to the roof of the mouth and sealed with wax to the teeth, thus making a completely new base-plate over the roof, bringing out all the rugæ in their natural form and reproducing the roof of the mouth as naturally as possible. Tin foil No. 60 is then placed over the lingual surface of the base-plate, burnished down well, and simply by a little warming fastened to the wax thoroughly. This tin foil is then trimmed all around, leaving the edge standing up about an eighth of an inch above the teeth. The edge is then cut with the scissors and bent over, so that when the plaster is poured on, the tin foil on the model will be held by the plaster to the lower half of the flask, while the tin foil on the lingual surface will be held by the plaster on the upper half of the flask. Thus, when the flask is separated, there will be a tin-foil covering on both the die and counter-die, so that when the flask is pressed together the rubber will be pressed between two tin dies, with the result that the plate will be very much denser than if it were made between plaster dies. After vulcanizing, the tin foil can be peeled off, leaving the plate perfectly polished on both sides. After trimming the rubber around the edge without any filing or scraping over the surface, the plate is finished by simply buffing it. The plate will then be of uniform thickness all over, very strong and dense, with a polished surface to come in contact with the roof of the mouth. This plate will not absorb secretions nearly as much as a plate made on plaster; it will cure what is known as "rubber sore mouth," owing to the fact that it is dense, close fitting, and does not absorb secretions which will decompose. Such a plate feels to the tongue almost like the natural tissues.

Dr. E. C. Hoffman, Plainfield, Ill. "Cast Reinforcements for Supporting and Retaining Artificial Dentures."

The clinician presented a method of

supporting and retaining artificial dentures by leaving one or more teeth in place and taking advantage of their contour, the angle in which they are set, and by perfect adaptation. A casting is made to fit over and around one or more of these teeth.

The first case shown was that of a mandibular ridge with all the teeth removed except the right and left second molars.

After the impression has been taken and the model prepared, a small wax plate is made to fit over and around the contour of the tooth, allowing it to extend posteriorly over the ridge and anteriorly about one-half an inch, leaving the crown of the tooth exposed. This is invested and cast, then the cast plate is placed over the natural tooth in the mouth, and fitted perfectly. Then a small casting is made to fit the mesial surface of the right molar, allowing this to extend one-half inch anteriorly over the ridge. These castings are placed on the model and finished by the usual method, and, when completed, the plate will be held in place, and can be taken out only in one way, namely, by lifting the casting over the left molar, which may be first crowned if the operator should so desire.

The second case showed the same method applied when all teeth are removed except the lower right second molar and lower left canine. This casting is made to extend from the mesial surface of the second molar, also anteriorly along the ridge and around the lower left canine, covering the contour of the mesio-distal and lingual surface, cutting away labially.

The third case showed the mandibular ridge with only the lower left canine and first bicuspid remaining. In this case a casting is first made to fit perfectly around the mesial surface of the canine and the distal surface of the first bicuspid, covering the lingual surfaces of both teeth and the adjoining ridge, cutting away labially. This is placed on the model, and the plate made of rubber, and although it is a partial plate, it will be found to be as strong as a full denture, and will have retaining features that will hold the plate in place better than clasps and with less wear on the teeth. The same principle may be applied in any part of the mouth where one or more teeth are left for retention. Castings may be made of Weston's metal, aluminum, or gold.

MISCELLANEOUS CLINICS.

Dr. W. H. WHITSLAR, Cleveland, Ohio. "Chirognomy Exhibit."

This clinic consisted in an exhibit of silhouettes of the hands of many dentists, some deceased, including Prof. W. D. Miller, Prof. Jonathan Taft, Dr. W. H. Morgan, Dr. A. W. Harlan, Dr. E. W. Branigan, Dr. W. C. Barrett, and others. The exhibit was intended for historical purposes principally, but some scientific value may accrue therefrom later.

Dr. L. E. CUSTER, Dayton, Ohio. "New Laboratory Appliances."

Dr. Custer exhibited a novel electrical device in the form of an automatic blowpipe. The gas is first ignited by a small arc, which is obtained from the switch, which starts a little electric motor used for compressing the air for the blowpipe. A Vernon rotary air-compressor furnishes the compressed air. The blowpipe hangs upon a hook when not in use, and when the blowpipe is removed from this hook, the motor is automatically started by a switch device operated by the hook.

Dr. Gustavus North, Cedar Rapids, Iowa. "Table Talk on Temperaments."

Temperaments are individual peculiarities of mental and physical structure; they are the index to the peculiarities of the individual, as the tongue is the index to the physical condition of the system.

Classification of the basal temperaments by the complexion is a strongly marked distinction, especially with the nervous and bilious. The color of the hair and eyes are sometimes confusing in some temperaments.

There are four basal and twelve or more dual or mixed temperaments. Most persons represent two or more temperaments.

Nervous temperament. Body slender, generally well formed; characterized by predominance of the nervous element; complexion light, muscles small and yielding, nervous and excitable, hair and eyes either light or dark. Teeth are pearl blue or gray in color, long and considerably narrower at the neck than at the cutting edge, with long bite. The occlusion is close and firm.

In illness the symptoms are mostly complicated with those of nervous disorder, there is a want of power and endurance; the pulse is generally firm, but more rapid than in other basal temperaments. General and oral diseases are less favorably responsive to treatment than in some other temperaments.

Bilious temperament. Person is spare, angular development characterized by a preponderance of bile; dark complexion, dark hair and eyes, lips purple; teeth of a yellowish color, long and rather narrow at the neck and shapely; occlusion close.

In persons of this temperament there is a tendency to biliary and digestive derangements. In illness the recuperative power is fair, the circulation is generally good with a strong pulse. This class of persons, as a rule, is susceptible to general and oral treatment.

Sanguine temperament. Person is generally well developed; complexion fair, hair light brown, eyes blue or gray, lips red; teeth cream color, average in size, about the same width at the neck as at the cutting edge, nicely formed, with rounded cusps, occlusion only moderately firm; the jaw inclines to rotate in masticating.

Diseases often take on an acute form; the tendency is to lung and heart trouble; general and oral diseases generally respond favorably to treatment.

Lymphatic temperament. Person is bulky in development, with looseness of tissue and structure, tendency to feebleness; complexion pallid; hair and eyes either light or dark, hair thin and straight and of a soft matted nature; clear mind; circulation feeble, pulse weak; teeth are dark, clouded in appearance, large and broad with thick rounded cusps; the occlusion is loose and flat; the jaw inclines to rotate in masticating.

The recuperative power is deficient, with a tendency to scrofula and chronic affections; general and oral diseases are not as favorable to treatment as in other temperaments.

The subject of temperaments presents itself to the clinician's mind as one of great importance. Very little has been written on the subject; it is generally conceived to be a difficult study, but such is not the case—it is easy to comprehend, and one can readily be taught to familiarize himself with the distinguishing characteristics.

Dr. J. B. Sebastian, Baltimore, Md. "Phenakit Cement."

This clinic consisted of a practical demonstration of the use of Phenakit silicate cement, showing the ease with which it is manipulated, its non-injurious qualities, translucency, and adhesiveness. The clinician claimed that steel instruments used in inserting this cement into cavities did not discolor the fillings.

Dr. G. M. Holden, Hackettstown, N. J. "An Aseptic Hair Protector for Inclosing Ladies' Hair During Dental Operations."

The protector shown by the clinician was made of a fine durable material which had been previously sterilized and preserved in a sealed envelope. The protector consists of a circular piece of lawn, hemmed at the periphery, with two buttonholes worked in it. Tape is passed through the hem, and the ends are allowed to extend from the buttonholes. The protector is applied by drawing each end of the tape until the protector is of about the size suitable for inclosing the front hair, when the front is placed in position and the edges are brought above the ears and under the back hair. Both ends of the tape are then drawn firmly and tied in a bow at the back of the neck. The protector is adjusted when the patient takes the chair, and is removed immediately before she leaves it. It is then folded and placed in an envelope, with the patient's name on it, and kept for that patient's exclusive use until the series of appointments is finished, when it is laundered.

By the use of this protector the hair is properly confined and out of the way of the operator; combs and pins are held in place, and hairdressing in the office becomes unnecessary. The object of this device is to further cleanliness, save female patients all inconvenience and discomfort during and after the operation, and spare time and annoyance to the operator.

Dr. Maurice Albrecht, Indianapolis, Ind. "Originality in Dental Instruments, Mixing Cements, etc."

This clinic consisted in a demonstration of the use of the following instruments:

(1) A glass spatula for mixing dental cements. The virtue of this instrument lies in the fact that it neither adds to nor detracts anything from the mix of cement, thereby insuring an absolutely pure mixture.

(2) Glass packers. These instruments are used in the introduction of silicate or other cement into the cavity, and are ideal for manipulating this material.

(3) Common-sense gold pluggers, with shank points only three-quarters of an inch in length, as against the two and one-quarter inches in length of the conventional instruments. The handles are covered with rubber tubing, which permits a firmer hold on the instrument and thereby considerably reduces the muscular effort. There are two sets of these instruments, one for foils and one for crystal gold.

(4) A mallet covered with four thicknesses of rubber dam. The addition of the rubber renders the blow equally efficient, more elastic, less jarring, and less dangerous.

(5) A double-end pin-setter, one end being straight, the other bent at a right angle. The latter is used in pressing home the retaining posts employed in root-canals.

Dr. L. J. Walker, Crafton, W. Va. "Advantages of Ambidextrous Operating."

The clinician demonstrated, by operating with equal dexterity with either hand, how readily an operation which is difficult to perform, for example with the right hand, becomes greatly simplified when done with the left, because the field is more favorably situated for a left-hand operation, and *vice versa*. He emphasized the following reasons why dental surgeons should train both hands:

(1) It is a great deal better to overcome the obstacle of an untrained hand once for all than to contend daily throughout years with the obstacles that pertain to at least one-third of all operations for a one-handed operator.

(2) No dentist has the right to claim extraordinary operative ability in a profession that requires the hands to be a second brain, possessed with a special sense, as long as one of his hands is so awkward that he could not butter a piece of bread with it.

The clinician stated further that acquiring ability to manipulate instruments with both hands is not nearly as difficult as at first appears. It requires a determination to begin, plus perseverance; the position and the movements of the trained hand must be observed closely as well as how the instruments are held. A few earnest efforts will produce surprisingly good results.

Dr. Dewey Duane Smith, Sandusky, Ohio. "The Application of Westinghouse Electric Heating to Dentistry."

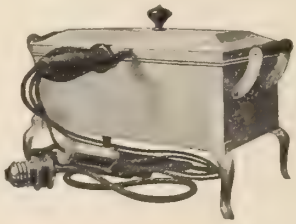
By the use of the Westinghouse Four-inch-disk Stove, which is guaranteed against burn-out, a gold annealer can be made by placing a piece of mica or small aluminum pin or ash tray on the top. After the gold is annealed perfectly, the current is turned off and the heat of the stove will be retained long enough to keep the gold in perfect working condition.

This same stove can be used for drying out investments, warming unvulcanized

rubber in the packing of plates, heating gutta-percha; it may also be employed as a water-heater by placing a small piece of asbestos under the water glass, and

can be put to many other uses that will suggest themselves to the operator.

The "Westinghouse milk-warmer" is a most convenient small sterilizer, and an



almost instantaneous water-heater. With the sterilizer basket—designed by the writer—to fit inside the milk-warmer, small instruments, burs, broaches, and the like can be sterilized.

Water will boil in this heater in two minutes. The heating element is inside the water instead of being underneath the vessel, thus assuring full efficiency. This vessel is also guaranteed against burn-out.

Dentists often need a little warm or hot water at the chair at once. This apparatus solves the problem.

The "larger dental sterilizer" is operated by the immersion element in the same way as the small one. This, as all other Westinghouse products, is fully guaranteed against burn-out.

The immersion element, or heat-producing part of these apparatus, consists in ribbons of metal laid between sheets of mica, then put under a pressure of ten thousand pounds and sealed with an oxy-acetylene blowpipe, thus excluding the oxygen and making the instruments non-oxidizable.

Dr. I. W. Copeland, Ashland, Ohio. "Helpful Hints for the Use of a Vacuum Cleaner."

A suction sweeper or vacuum cleaner may be used for operating spray bottles, hot-air syringes, in fact, for all operations in which compressed air is indicated. It may also be used in operating a blowpipe and a vacuum casting machine; in the latter it offers the advantage of giving a constant powerful suction which may be continued until the metal has solidified, thereby doing away with the tendency of the metal to assume a spherical shape. The vacuum cleaner may also be employed for removing infected débris from cavities during preparation, in place of the chip-blower, which subjects both patient and operator to the danger of inhaling the débris. These, and many other uses of this machine which will suggest themselves, enable the operator to keep his office or laboratory absolutely free from all dust.

In adapting such a machine to the dentist's needs it is best to place it in the laboratory or some other part of the office where it will be out of the way, and where the slight noise which the apparatus makes will not be objectionable. The power can then be conveyed to any portion of the office, or to as many different points as desired, by means of a half-inch galvanized pipe fitted up at each opening with a valve and nipple for the connections. In conjunction with the piping may also be installed electric connections so that the apparatus may be started from any point. Foot switches may be used for this purpose, if desired.

The casting apparatus which may be operated with this machine consists of a base for the investment rings to rest upon, to which is attached a short piece of one-eighth inch pipe with a valve for controlling the pressure in casting. There are two openings in the various types of vacuum cleaners, the air being drawn in at one and forced out at the other, and in this way the blowpipe may be operated at the same time that the suction feature is utilized.

APPENDIX.

Organization of the N. D. A.

OFFICERS, 1911-12.

President—A. R. MELENDY, 1 Deaderick bldg., Knoxville, Tenn.
Vice-president—South—L. P. DOTTERER, 102 Broad st., Charleston, S. C.
" " West—D. O. M. LECRON, 501 Missouri Trust bldg., St. Louis, Mo.
" " East—L. L. BARBER, 718 Spitzer bldg., Toledo, Ohio.
Corresponding Secretary—C. W. RODGERS, 165 Harvard st., Boston, Mass.
Recording Secretary—H. C. BROWN, 185 E. State st., Columbus, Ohio.
Treasurer—H. B. MCFADDEN, 3505 Hamilton st., Philadelphia, Pa.

EXECUTIVE COUNCIL.

Chairman—H. J. BURKHART, Batavia, N. Y.

CHAS. MCMANUS, 80 Pratt st., Hartford, Conn.
A. H. PECK, 92 State st., Chicago, Ill.
EUGENE R. WARNER, 401 California bldg., Denver, Colo.
B. HOLLY SMITH, 1007 Madison ave., Baltimore, Md.
A. R. MELENDY and HOMER C. BROWN (*ex-officio* members).

EXECUTIVE COMMITTEE.

Chairman—J. D. PATTERSON, Keith & Perry bldg., Kansas City, Mo.

FIRST DIVISION—Committee on Arrangements.

J. D. PATTERSON, [*1914], Keith & Perry bldg., Kansas City, Mo.
C. M. WORK [*1912], Ottumwa, Iowa.
W. G. MASON [*1912], Tampa, Fla.

SECOND DIVISION—Committee on Credentials and Auditing.

V. H. JACKSON [*1912], 40 E. 41st st., New York, N. Y.
V. S. JONES [*1914], Bethlehem, Pa.
M. F. FINLEY, [*1913], 1928 "I" st., N. W., Washington, D. C.

* Term expires.

THIRD DIVISION—Committee on Voluntary Essays.

LOUIS MEISBURGER [*1913], 85 N. Pearl st., Buffalo, N. Y.
DON M. GALLIE [*1913], 100 State st., Chicago, Ill.
C. J. GRIEVES [*1914], Park ave. and Madison st., Baltimore, Md.

* Term expires.

ORGANIZATION OF SECTIONS.

SECTION I: Prosthetic Dentistry, Crown and Bridge Work, Orthodontia, Metallurgy, Chemistry, and Allied Subjects.

WESTON A. PRICE, *Chairman*, 10406 Euclid ave., Cleveland, Ohio.
HARRY E. KELSEY, *Vice-chairman*, 817 Park ave., Baltimore, Md.
MARCUS L. WARD, *Secretary*, 703 University ave., Ann Arbor, Mich.

SECTION II: Operative Dentistry, Nomenclature, Literature, Dental Education, and Allied Subjects.

FRANK O. HETRICK, *Chairman*, Ottawa, Kans.
JOS. HEAD, *Vice-chairman*, 1500 Locust st., Philadelphia, Pa.
E. P. DAMERON, *Secretary*, 58 DeMenil bldg., St. Louis, Mo.

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

W. H. G. LOGAN, *Chairman*, 42 Madison ave., Chicago, Ill.
E. E. HALL, *Vice-chairman*, First Nat'l Bank bldg., Columbus, Ohio.
T. P. HINMAN, *Secretary*, Fourth Nat'l Bank bldg., Atlanta, Ga.

COMMITTEES.

History.

CHAS. MCMANUS, *Chairman*, 80 Pratt st., Hartford, Conn.
BURTON LEE THORPE, *Vice-chairman*, 3605 Lindell boulevard, St. Louis, Mo.
CHAS. S. BUTLER, *Secretary*, 267 Elmwood ave., Buffalo, N. Y.
EDWARD C. KIRK, Philadelphia, Pa.
HENRY L. AMBLER, Cleveland, Ohio.
WM. H. TRUEMAN, Philadelphia, Pa.
STARR PARSONS, Washington, D. C.
WALDO E. BOARDMAN, Boston, Mass.
JOHN W. DAVID, Corsicana, Texas.
W. O. HULICK, Cincinnati, Ohio.

State and Local Societies.

H. C. Brown, *Chairman*, 185 E. State st., Columbus, Ohio.
Waldo E. Boardman, *Vice-chairman*, 419 Boylston st., Boston, Mass.
Frank O. Hetrick, *Secretary*, Ottawa, Kans.
Chas. L. Alexander, Charlotte, N. C.
W. W. Walker, New York, N. Y.
W. G. Dalrymple, Ogden, Utah.
Chas. C. Allen, Kansas City, Mo.
Henry A. Kelley, Portland, Me.
Fred W. Gethro, Chicago, Ill.
Otto U. King, Huntington, Ind.
Jos. D. Eby, Atlanta, Ga.
J. H. Wallace, Omaha, Neb.
H. F. Hoffman, Denver, Colo.
A. J. Cottrell, Knoxville, Tenn.
C. E. Post, San Francisco, Cal.

Dental Journal.

Herbert L. Wheeler, *Chairman*, 560 Fifth ave., New York, N. Y.
Frank T. Taylor, *Vice-chairman*, 419 Boylston st., Boston, Mass.
Burton Lee Thorpe, *Secretary*, 3605 Lindell boulevard, St. Louis, Mo.
Chas. S. Butler, Buffalo, N. Y.
J. D. Patterson, Kansas City, Mo.
J. G. Fife, Dallas, Texas.
Chas. R. Turner, Philadelphia, Pa.

Dental Museum and Library.

G. W. Boynton, *Chairman*, 817 Fourteenth st., N. W., Washington, D. C.
C. A. Hawley, *Vice-chairman*, The Rochambeau, Washington, D. C.
M. F. Finley, *Secretary*, 1928 "I" st., N. W., Washington, D. C.
H. W. Morgan, Nashville, Tenn.
Horace Warren, Missouri Valley, Iowa.
H. T. Smith, Cincinnati, Ohio.
B. D. Brabson, Knoxville, Tenn.
J. H. Lorenz, Atlanta, Ga.
Thos. L. Rust, Washington, D. C.

Publication.

H. C. Brown, *Chairman*, 185 E. State st., Columbus, Ohio.
Chas. W. Cuthbertson, Washington, D. C.
W. I. Jones, Columbus, Ohio.

Oral Hygiene.

W. G. Ebersole, *Chairman*, 800 Schofield bldg., Cleveland, Ohio.
B. Holly Smith, *Vice-chairman*, 1007 Madison ave., Baltimore, Md.
Waldo E. Boardman, *Secretary*, 419 Boylston st., Boston, Mass.
J. V. Conzett, Dubuque, Iowa.
S. W. Foster, Atlanta, Ga.

Necrology.

Wilbur F. Litch, *Chairman*, 31 Simpson road, Ardmore, Pa.
Jas. McManus, *Vice-chairman*, 80 Pratt st., Hartford, Conn.
C. W. Strang, *Secretary*, Sanford bldg., Bridgeport, Conn.
G. S. Vann, Gadsden, Ala.
N. S. Hoff, Ann Arbor, Mich.

Army and Navy Dental Legislation.

Wm. Crenshaw, *Chairman*, P. O. Box 942, Atlanta, Ga.
W. H. DeFord, *Vice-chairman*, 609 Walnut st., Des Moines, Iowa.
Chas. W. Rodgers, *Secretary*, 165 Harvard st., Dor., Boston, Mass.

Patents.

Emory A. Bryant, *Chairman*, The Burlington, Washington, D. C.
Chas. R. E. Koch, *Secretary*, 87 Lake st., Chicago, Ill.
C. N. Johnson, Chicago, Ill.

Public Health.

M. F. Finley, *Chairman*, 1928 "I" st., N. W., Washington, D. C.
Wms. Donnally, *Secretary*, 1612 "I" st., N. W., Washington, D. C.
W. A. White, Phelps, N. Y.
Frank L. Platt, San Francisco, Cal.
S. A. Long, McAlester, Okla.

Clinics.

C. J. Grieves, *Chairman*, Park ave. and Madison st., Baltimore, Md.
A. O. Ross, *Vice-chairman*, 807 N. High st., Columbus, Ohio.
S. W. Bowles, *Secretary*, 1315 New York ave., Washington, D. C.
W. R. Clack, Mason City, Iowa.
A. P. Burkhart, Auburn, N. Y.
J. T. McClenahan, Washington, D. C.
W. D. Tracy, New York, N. Y.
M. C. Smith, Lynn, Mass.
John H. McClure, Wheeling, W. Va.
J. E. Chace, Ocala, Fla.
E. L. Pettibone, Cleveland, Ohio.
H. J. Allen, Washington, D. C.
W. R. Wright, Jackson, Miss.
Chas. S. Irwin, Vancouver, Wash.
S. H. McAfee, New Orleans, La.
C. M. Barnwell, Atlanta, Ga.
R. L. Simpson, Richmond, Va.
W. H. Scherer, Houston, Texas.

Scientific Research.

Henry C. Ferris, *Chairman*, 140 W. 57th st., New York, N. Y.
H. Carlton Smith—representing Harvard Univ., Dental Dep't.
Russell W. Bunting—Michigan Univ., Dental Dep't.
Fred. B. Noyes—Northwestern Univ., Dental School.
A. W. Lee—California Univ., Dental Dep't.
W. H. G. Logan—Chicago College of Dental Surgery.
E. Hoffmeister—Baltimore College of Dental Surgery.
J. B. Stein—New York College of Dentistry.
Friedrich Hecker—Kansas City Dental College.
H. M. Semans—Starling-Ohio Medical College, Dental Dep't.

Pharmacopeial Convention.

M. F. FINLEY, *Chairman*, 1928 "I" st., N. W., Washington, D. C.
A. H. PECK, Chicago, Ill.
JOS. HEAD, Philadelphia, Pa.

Educational Council.

J. V. CONZETT, *Chairman*, Dubuque, Iowa.
RICHARD SUMMA, St. Louis, Mo.
LOUIS MEISBURGER, Buffalo, N. Y.
A. R. MELENDY, Knoxville, Tenn.
HOWARD E. ROBERTS, Philadelphia, Pa.

Revision of Constitution and By-laws.

J. D. PATTERSON, *Chairman*, Keith & Perry bldg., Kansas City, Mo.
B. HOLLY SMITH, *Vice-chairman*, 1007 Madison ave., Baltimore, Md.
H. C. BROWN, *Secretary*, 185 E. State st., Columbus, Ohio.
EDWARD S. GAYLORD, New Haven, Conn.
R. OTTOLENGUI, New York, N. Y.

Publicity.

C. B. WARNER, *Chairman*, Urbana, Ill.
B. HOLLY SMITH, Baltimore, Md.
CHAS. S. BUTLER, Buffalo, N. Y.

National Relief Fund.

L. G. NOEL, *Chairman*, 527½ Church st., Nashville, Tenn.
EDWARD S. GAYLORD, New Haven, Conn.
WM. T. CHAMBERS, Denver, Colo.

Miller Memorial.

TRUMAN W. BROPHY, *Chairman*, 81 Madison ave., Chicago, Ill.
WM. CARR, New York, N. Y.
B. HOLLY SMITH, Baltimore, Md.

Delegates to International Federation.

BURTON LEE THORPE, St. Louis, Mo.
WM. CARR, New York, N. Y.
S. H. GUILFORD, Philadelphia, Pa.
WALDO E. BOARDMAN, Boston, Mass.

Local Committee of Arrangements.

(WASHINGTON, D. C.)

JOHN H. LONDON, *Chairman*, 926 Farragut Square.

THOS. L. RUST, *Vice-chairman*, 1408 "L" st., N. W.

C. A. HAWLEY, *Secretary*, The Rochambeau.

CHAIRMEN OF SUBCOMMITTEES.

Publicity and Transportation—W. D. MONROE, The Farragut.

Finance—GEO. W. BOYNTON, 817 Fourteenth st., N. W.

Clinics—FENTON BRADFORD, The Rochambeau.

Entertainment—C. A. BAKER, 1120 Vermont ave., N. W.

Hotels and Assembly Hall—M. F. FINLEY, 1928 "I" st., N. W.

Reception—WMS. DONNALLY, 1612 "I" st., N. W.

LIST OF MEMBERS.

* *Indicates*—Members of Southern Branch.

*Adair, R. B., 502 Lowndes bldg., Atlanta, Ga.
*Adair, Robin, 502 Lowndes bldg., Atlanta, Ga.
Adams, R. A., 701 Symes bldg., Denver, Colo.
Adams, W. Claude, 122½ Grand ave., Portland, Ore.
Albrecht, Maurice, 413 Lake bldg., Indianapolis, Ind.
Alexander, C. L., 203 S. Tryon st., Charlotte, N. C.
Allen, C. C., 507 Rialto bldg., Kansas City, Mo.
*Allen, H. Jerome, 1616 "I" st., Washington, D. C.
*Allen, T. M., Tampa, Fla.
Allis, D. Hurlbut, Masonic Temple, Springfield, Mass.
Alter, C. H., Hilltop, Colo.
Ambler, H. L., 428 Rose bldg., Cleveland, Ohio.
Ames, W. V-B., 151 N. Wabash ave., Chicago, Ill.
Andrews, G. F., 820 Germania Life bldg., St. Paul, Minn.
Appel, Peter, Jr., Box 643, Cheyenne, Wyo.
*Archinard, L. D., 830 Macheca bldg., New Orleans, La.
Arthur, H. W., 618 Jenkins bldg., Pittsburgh, Pa.
Ash, Chas. F., 115 Broadway, New York.
*Askew, J. B., Vicksburg, Miss.
*Atkinson, D. D., Brunswick, Ga.
*Atlee, B. G., Monterey, Mexico.

Bacon, D. C., 31 N. State st., Chicago, Ill.
Baker, Chester A., 1120 Vermont ave., Washington, D. C.
Baker, G. F., Twin Falls, Idaho.
Baker, G. T., 419 Boylston st., Boston, Mass.
Ball, F. E., Fargo, N. Dak.
Ballachey, F. A., 450 Elmwood ave., Buffalo, N. Y.
Banzhaf, H. L., Wells bldg., Milwaukee, Wis.
Barber, A. R., Ogden, Utah.
Barber, L. L., 718 Spitzer bldg., Toledo, Ohio.
*Barnett, A., Memphis, Tenn.
Barnett, J. W., Little Rock, Arkansas.
*Barnwell, C. M., 721 Grant bldg., Atlanta, Ga.
Barrett, T. J., Worcester, Mass.
Baylis, C. F., Oneonta, N. Y.
Beach, J. W., 52 N. Pearl st., Buffalo, N. Y.
Beach, Louis L., Bristol, Conn.
Bean, Geo L., 350 Post st., San Francisco, Cal.
Beatty, C. H., The LaMar, Dayton, Ohio.
Beck, H. M., 68 W. Northampton st., Wilkes-Barre, Pa.
Beckwith, W. D., Waynesboro, Ga.
Beecher, Wm. O., Waterbury, Conn.
Beecroft, W. G., 101 N. Hamilton st., Madison, Wis.
Belcher, W. W., 122 N. Clinton st., Rochester, N. Y.
Belford, E. E., 1327 E. 93d st., Cleveland, Ohio.
Bell, J. R., 1821 E. 20th st., Cleveland, Ohio.
Bellchamber, C. E., Effingham, Ill.
Bellefleur, Jos. L., 125 Washington st., Salem, Mass.
Bernheim, J. R., care of Surgeon-general's Office, Washington, D. C.
Berthaumm, C. L., Boise, Idaho.
Bibber, W. R., Grady bldg., Eastport, Me.
Biddle, J. F., 517 Arch st., Pittsburgh, Pa.

BLACK, ARTHUR D., 22 E. Washington st., Chicago, Ill.
BLACK, G. V., Madison and Franklin sts., Chicago, Ill.
BLAIN, J. HARVEY, Prescott, Ariz.
BLAISDELL, E. C., 3 Market st., Portsmouth, N. H.
*BLALOCK, L. F., Ocala, Fla.
*BLAND, C. A., 21 N. Tryon st., Charlotte, N. C.
BOARDMAN, WALDO E., 419 Boylston st., Boston, Mass.
*BOGLE, R. BOYD, 719 Russell st., Nashville, Tenn.
BOGUE, E. A., 63 W. 48th st., New York, N. Y.
BOHN, H. W., 34 N. 9th st., Reading, Pa.
BONAR, E. A., Clay Center, Kans.
BOOKER, F. D., Rochester, Minn.
BOTHWELL, JOHN A., 26 College st., Toronto, Can.
*BOWLES, S. W., 1315 New York ave., Washington, D. C.
*BOYD, H. T., Sweetwater, Tenn.
BOYDSTON, WALTER J., Fairmont W. Va.
BOYNTON, G. W., 817 14th st., N. W., Washington, D. C.
*BRABSON, B. D., 522½ S. Gay st., Knoxville, Tenn.
BRADFIELD, S. G., Nowata, Okla.
BRADFORD, FENTON, The Rochambeau, Washington, D. C.
BRAITHWAITE, EARL I., Chicago, Ohio.
BRATT, C. B., Westinghouse bldg., Allegheny, Pa.
*BRAUD, O. L., Thibodeaux, La.
BREEN, J. M., 115 E. 17th st., New York, N. Y.
BREENE, F. T., 105 Washington st., Iowa City, Iowa.
BRIDGEMAN, GEO., New Martinsville, W. Va.
BRIERLY, W. A., Denver, Colo.
BRIGGS, E. C., 129 Marlboro st., Boston, Mass.
BRININSTOOL, C. L., 1105 Granite bldg., Rochester, N. Y.
BROCK, H. C., North Platte, Nebr.
*BROCKETT, C. T., 301 Grand bldg., Atlanta, Ga.
*BROOKS, J. H., Burlington, N. C.
BROOKS, KING, Lexington, Ky.
BROPHY, TRUMAN, 1405 Chaplain bldg., Chicago, Ill.
BROWN, ARTHUR I., 1115 New England bldg., Cleveland, Ohio.
BROWN, C. E., Emerson, Neb.
BROWN, G. V. I., 445 Milwaukee st., Milwaukee, Wis.
BROWN, H. C., 185 E. State st., Columbus, Ohio.
BROWN, IRA W., 1114 New England bldg., Cleveland, Ohio.
BROWNLEE, I. C., 403 California bldg., Denver, Colo.
BRUNK, G. L., Elida, Ohio.
BRUZELIUS, AXEL N., Lima, Ohio.
BRYANT, E. A., "The Burlington," Washington, D. C.
BRYANT, E. R., 972 Chapel st., New Haven, Conn.
*BUCK, F. E., Jacksonville, Fla.
BUCKLEY, J. P., 39 S. State st., Chicago, Ill.
BUNTING, RUSSELL W., Ann Arbor, Mich.
BURDATS, O. W., Wheeling, W. Va.
BURKHART, A. P., 333 Franklin st., Buffalo, N. Y.
BURKHART, H. J., Batavia, N. Y.
BURNS, F. D., 322 Century bldg., Durango, Colo.
BURRIDGE, W. J., 1392 Haight st., San Francisco, Cal.
BURRIS, C. J., Washington, Ind.
BURTON, ISAAC, 204 Hagerman bldg., Colorado Springs, Colo.
BUSH, ALDEN, First Nat'l Bank bldg., Columbus, Ohio.
BUTLER, CHAS. R., 3912 Prospect ave., Cleveland, Ohio.
BUTLER, C. S., 267 Elmwood ave., Buffalo, N. Y.

CALDWELL, D. S., Charlotte, N. C.
CALLAHAN, J. R., 25 Garfield Place, Cincinnati, Ohio.
*CAMPBELL, H. W., Suffolk, Va.
*CAMPBELL, T. J., Okolona, Miss.
CANADAY, J. W., 383 State st., Albany, N. Y.
CAPON, W. A., 405 Real Estate Trust bldg., Philadelphia, Pa.
*CARLISLE, JNO. P., Greenville, S. C.
CARPENTER, ALDEN, West Point, N. Y.
CARR, ELLEN R., Collinsville, Conn.
*CARR, I. N., Durham, N. C.
CARR, WM., 560 5th ave., New York, N. Y.
CARRABINE, OSCAR, 542 5th ave., New York, N. Y.
*CARROLL, R. W., Beaumont, Texas.
CARSON, EDGAR M., 1115 Union boulevard, St. Louis, Mo.
*CARSON, W. L., Cartersville, Ga.

*Carter, A. B., Garland, Texas.
Case, Calvin S., 1120 Stewart bldg., Chicago, Ill.
*Cason, W. L., Moultrie, Ga.
*Cassidy, J. S., Covington, Ky.
Cate, A. W., Boise, Idaho.
*Chace, J. E., Ocala, Fla.
Chambers, W. T., 504 California bldg., Denver, Colo.
Chance, A. W., 810 Corbett bldg., Portland, Ore.
Chatlin, R. A., Richmond, Ind.
Charters, Wm. J., 520 Walnut st., Des Moines, Iowa.
Chilcott, L. S., Bangor, Maine.
*Chipps, H. D., Corinth, Miss.
Chisholm, W. W., Anderson, S. C.
Clack, W. R., Mason City, Iowa.
Clapp, Howard, 10 Longwood Terrace, Boston, Mass.
Clark, D. C., Blacksville, W. Va.
*Clark, G. K., Russellville, Ky.
Cobb, F. E., 307 Masonic Temple, Minneapolis, Minn.
Codman, B. H., 126 Massachusetts ave., Boston, Mass.
Cogan, W. N., "The Sherman," Washington, D. C.
*Collier, G. W., San Antonio, Texas.
Conrad, Wm., 3666 Olive st., St. Louis, Mo.
Conzett, J. V., 256 13th st., Dubuque, Iowa.
Cook, Geo. W., 47th st. and Kenwood ave., Chicago, Ill.
*Cook, S. B., Loveman Block, Chattanooga, Tenn.
Cooke, A. R., 815 University Block, Syracuse, N. Y.
Cooke, W. P., 330 Dartmouth st., Boston, Mass.
Copeland, I. W., Ashland, Ohio.
Coriell, Louis, 516 Park ave., Baltimore, Md.
*Corley, J. P., Greensboro, Ala.
*Cosby, D. C., Lampasas, Texas.
Coston, W. A., Topeka, Kans.
*Cottrell, A. J., Deaderick bldg., Knoxville, Tenn.
*Crenshaw, Thos., 621 Grant bldg., Atlanta, Ga.
*Crenshaw, Wm., 621 Grant bldg., Atlanta, Ga.
*Crossland, J. H., Montgomery, Ala.
Crouse, J. N., 2231 Prairie ave., Chicago, Ill.
*Crumley, L. A., Birmingham, Ala.
Cruzen, E. E., Professional bldg., Baltimore, Md.
Cryer, M. H., 1623 Walnut st., Philadelphia, Pa.
Culver, M. B., 1529 Locust st., Philadelphia, Pa.
*Cummings, W. G., Harriman, Tenn.
Cummins, J. T., Odd Fellows' Temple, Metropolis, Ill.
Currie, A. W., 626 Lexington ave., New York, N. Y.
Custer, L. E., 28 N. Ludlow st., Dayton, Ohio.
Cutting, A. J., Southington, Conn.

Dailey, Wilber M., 19 E. 69th st., New York, N. Y.
Dalrymple, W. G., 2124 Washington ave., Ogden, Utah.
Dameron, E. P., 58 DeMenil bldg., St. Louis, Mo.
Danforth, J. S., Sacher bldg., Sheboygan, Wis.
Darby, E. T., 1701 Locust st., Philadelphia, Pa.
Darling, J. H., Lake Preston, S. D.
*Dashwood, P. T., 613 Grant bldg., Atlanta, Ga.
Daugherty, T. E., Guthrie Center, Iowa.
Davenport, I. B., 30 Avenue de l'Opera, Paris, France.
Davenport, L. C., Fargo, N. D.
*David, J. W., Corsicana, Texas.
*Davidson, H. M., Hubbard, Tex.
*Davis, C. P., Americus, Ga.
Davis, L. F., Southern bldg., 15th and 8th st., Washington, D. C.
Davis, Sheldon G., 729 15th st., Washington, D. C.
Davis, W. Clyde, 206 Richards block, Lincoln, Neb.
Dawson, H. D., 1616 "I" st., Washington, D. C.
*Dean, W. A., Tampa, Fla.
Deane, W. C., 616 Madison ave., New York, N. Y.
DeFord, W. H., Drake Univ., Des Moines, Iowa.
Delbridge, Wm. H., Jr., Greeley, Colo.
DeLong, W. D., 762 Penn st., Reading, Pa.
Dennis, W. C., Jackson, Miss.
Diedel, Chas., "The Burlington," Washington, D. C.

Dille, Frank, Greeley, Colo.
Dimond, W. B., Lamar, Mo.
Dole, E. W., Uhrichsville, Ohio.
Donegan, E. J., Scranton, Pa.
Donelan, T. P., Odd Fellows' Hall, Springfield, Ill.
*Donnally, Wms., 1612 "I" st., Washington, D. C.
Dorsey, Chester W., 340 Fairfield ave., Bellevue, Ky.
*Dotterer, L. P., 102 Broad st., Charleston, S. C.
Douglas, J. K., Sandusky, Ohio.
Dowden, Jas. E., Fairmount, W. Va.
Dowsley, J. F., 175 Tremont st., Boston, Mass.
*Dubose, J. A., Anniston, Ala.
*Ducasse, A. Louis, 204 Camp st., New Orleans, La.
Dunning, W. B., 140 W. 57th st., New York.
*Dyer, A. A., Galveston, Tex.

Eberle, Edward, Sage-Allen bldg., Hartford, Conn.
Ebersole, W. G., 800 Schofield bldg., Cleveland, Ohio.
*Eby, J. D., Fourth Nat'l Bank bldg., Atlanta, Ga.
Eddy, C. N., Boulder, Colo.
Eddy, Forrest G., 221 Butler Exchange, Providence, R. I.
Eisenhart, Wm. S., York, Pa.
Ellis, W. H., Bloomington, Wis.
Ellis, W. H., 397 Delaware ave., Buffalo, N. Y.
Engle, H. S., Lineville, Iowa.
English, M. H., Wray, Colo.
Eschelman, M. B., 170 Hodge ave., Buffalo, N. Y.
Eshleman, G. W., 1-3 Brummer block, Cherokee, Iowa.
Eubank, Alfred, Birmingham, Ala.
*Eubank, G. E., Birmingham, Ala.
*Evans, Paul W., Bond bldg., Washington, D. C.

*Ewald, W. H., Norfolk, Va.
*Exley, F. C., 202 Liberty st., Savannah, Ga.

Fahrney, S. W., 108 N. State st., Chicago, Ill.
Farrell, Chester C., Cozad, Neb.
Faught, L. Ashley, 1430 Spruce st., Philadelphia, Pa.
*Fawlkes, C. B., Mobile, Ala.
*Feagin, G. M., Albemarle, N. C.
Ferreby, T. G., Humboldt, Iowa.
Ferris, H. C., 145 W. 57th st., New York, N. Y.
Fickes, Wm. L., 6200 Penn ave., Pittsburgh, Pa.
Fields, J. W., McPherson, Kans.
*Fife, J. G., 736 Wilson bldg., Dallas, Texas.
Finley, M. F., 1928 "I" st., N. W., Washington, D. C.
*Finney, W. B., 813 Hamilton Terrace, Baltimore, Md.
Fisher, W. C., 373 Fifth ave., New York, N. Y.
Flanagan, A. J., 352 Main st., Springfield, Mass.
Fogg, W. S., Cornish, Maine.
Fones, A. C., 521 State st., Bridgeport, Conn.
Ford, L. E., 710 Security bldg., Los Angeles, Cal.
Fossume, A. W., Aberdeen, S. D.
Fossume, F. L., 616 Madison ave., New York, N. Y.
*Foster, S. W., 100 N. Butler st., Atlanta, Ga.
Fowler, Wm., Box 734, Colorado Springs, Colo.
Frank, H. J., 1203 Masonic Temple, Chicago, Ill.
*Frankland, W. S., "The Burlington," N. W., Washington, D. C.
Franz, Hugo, 31 Washington st., Chicago, Ill.
Frazee, O. L., Springfield, Ill.
*Friedrichs, A. G., 641 St. Charles st., New Orleans, La.
Friesell, H. E., 6120 Center ave., Pittsburgh, Pa.
*Frink, C. H., Jacksonville, Fla.
Fruth, O. J., 3066 Hawthorne Boulevard, St. Louis, Mo.
Fundenberg, W. H., 644 Oliver bldg., Pittsburgh, Pa.
Fynn, H. A., 500 California bldg., Denver, Col.

Gage, R. R., 1032 Rose bldg., Cleveland, Ohio.
Gallie, Don M., 32 N. State st., Chicago, Ill.
Galloway, G. M., Spencer, W. Va.
Gardiner, F. D., 1516 Locust st., Philadelphia, Pa.
Gaylord, E. S., 63 Trumbull st., New Haven, Conn.

GEARHART, C. M., 1616 "I" st., Washington, D. C.
GEISER, JOHN S., 1607 Edmondson ave., Baltimore, Md.
GETHRO, F. W., 917 Marshall Field bldg., Chicago, Ill.
GILLETT, HENRY W., 140 W. 57th st., New York, N. Y.
GILMAN, W. F., 11 Pleasant st., Worcester, Mass.
GILMER, T. L., 923 Marshall Field bldg., Chicago, Ill.
GOOD, ROBERT, 104 S. Michigan ave., Chicago, Ill.
GOODE, GLADSTONE, 576 Fifth ave., New York.
GOODWIN, N. J., 783 Main st., Hartford, Conn.
*GORDON, S. J., Mobile, Ala.
*GORMAN, J. A., New Orleans, La.
GOSLEE, H. J., 92 State st., Chicago, Ill.
GRADY, RICHARD, Naval Academy, Annapolis, Md.
GRANT, G. W., Bucyrus, Ohio.
*GRANT, W. E., 419 W. Chestnut st., Louisville, Ky.
GRAY, B. F., 803 Security bldg., Los Angeles, Cal.
GREENBAUM, LEO, 741 Fifth ave., New York.
GREGORY, F. G., 7 W. Park st., Newark, N. J.
*GRIEVES, C. J., Madison and Park aves., Baltimore, Md.
*GRIFFISS, R. D., Paris, Texas.
GRIFFITH, EDW. B., Bridgeport, Conn.
GRISWOLD, E. R., Dansville, N. Y.
GROSBY, C. P., Victoria bldg., St. Louis, Mo.
*GROSJEAN, S. S., New Orleans, La.
GROSS, O. J., Box 885, Schenectady, N. Y.
*GUNN, C. L., Gadsden, Ala.
GUILFORD, S. H., 124 S. 18th st., Philadelphia, Pa.
GUILFORD, DUDLEY, 124 S. 18th st., Philadelphia, Pa.

HADLEY, AMOS I., 125 Marlboro st., Boston, Mass.
HALL, E. E., 904 First Nat'l Bank bldg., Columbus, Ohio.
HALL, EUGENE H., 904 First National Bank bldg., Columbus, Ohio.
*HALL, J. A., Collinsville, Ala.
*HALL, WILMER S., Pensacola, Fla.
HALLEY, J. K., 816 15th st., N. W., Washington, D. C.
HAMM, A. C., 623 Mack bldg., Denver, Colo.
*HARDIN, J. FELTUS, Tuscaloosa, Ala.
HARDY, C. S., Summit, N. J.
*HARDY, GEO. E., Madison and Franklin sts., Baltimore, Md.
HARMS, B. H., Belle Fourche, S. D.
HARNED, C. W., Iowa City, Iowa.
HARPER, W. E., 3441 Michigan ave., Chicago, Ill.
HARTZELL, T. B., 512 Nicollet ave., Minneapolis, Minn.
*HASSELL, H. C., Tuscaloosa, Ala.
HAVERSTICK, E. E., 346 Boyle ave., St. Louis, Mo.
HAWES, EARL P., 268 Weybosset st., Providence, R. I.
HAWLEY, C. A., "The Rochambeau," Washington, D. C.
HAYDEN, GILLETTE, 904 First National Bank bldg., Columbus, Ohio.
HAYWARD, T. T., Excelsior, Lake Minnetonka, Minn.
HEAD, JOS., 1500 Locust st., Philadelphia, Pa.
HECKARD, W. A., 489 Fifth ave., New York.
HEINEMANN, O. S., 808 Laurel st., Cincinnati, Ohio.
HENRY, H. L., Ashland, Neb.
HERGART, F. W., 811 First ave., Seattle, Wash.
HERT, B. S., 713 Chamber of Commerce, Rochester, N. Y.
HERTZ, J. C., 111 S. Fourth st., Easton, Pa.
HETRICK, F. O., Ottowa, Kansas.
HILLYER, ELLISON, 1143 Dean st., Brooklyn, N. Y.
*HINMAN, THOS. P., Fourth Nat'l Bank bldg., Atlanta, Ga.
HIPPLE, A. H., 200 Bee bldg., Omaha, Neb.
HITCH, D. M., 1621 Chestnut st., Philadelphia, Pa.
HITCH, GAYL A., Laurel, Del.
HOCKING, W. E., Devils Lake, N. D.
HODGE, L. D., Arkansas City, Kans.
HOFF, N. S., 603 S. State st., Ann Arbor, Mich.
HOFFMAN, ABRAM, 529 Franklin st., Buffalo, N. Y.
HOFFMAN, H. F., 524 Metropolitan bldg., Denver, Colo.
HOFHEINZ, R. H., 815 Chamber of Commerce, Rochester, N. Y.
HOGAN, E. L., Stanwood, Wash.
HOGAN, JOHN G., Bedford, Ind.
HOLDEN, GEO. M., Hackettstown, N. J.
*HOLLAND, FRANK, Grant bldg., Atlanta, Ga.
HOLLINGSWORTH, J. G., 403 Rialto bldg., Kansas City, Mo.

*Holloway, B. L., Brookhaven, Miss.
Hopkins, S. A., 235 Marlboro st., Boston, Mass.
Hopkinson, B. Merrill, 415 Professional bldg., Baltimore, Md.
*Hopping, J. G., Birmingham, Ala.
Hosley, H. Everton, Phoenix bldg., Springfield, Mass.
Howard, E. G., 322 Bradbury bldg., Los Angeles, Cal.
Howard, M. R., 416 Commonwealth bldg., Denver, Colo.
Howe, Horace L., 196 Marlboro st., Boston, Mass.
*Howell, I. B., Columbia bldg., Paducah, Ky.
Howland, S. Oscar, 148 Main st., Gloucester, Mass.
Huey, Robt., 330 S. 15th st., Philadelphia, Pa.
*Huff, M. D., Grant bldg., Atlanta, Ga.
*Hughes, C. N., Atlanta, Ga.
Hulick, W. O., 807 Union Trust bldg., Cincinnati, Ohio.
Hull, H. A., Box 74, New Brunswick, N. J.
Hull, J. W., 607 Commerce bldg., Kansas City, Mo.
Hungerford, C. L., 518 Reliance bldg., Kansas City, Mo.
Hunt, F. G., 1705 Lawrence st., Denver, Colo.
*Hunt, F. L., Asheville, N. C.
Hunt, Geo. E., 131 E. Ohio st., Indianapolis, Ind.
Hunt, W. J., Memphis, Tenn.
Hutchinson, L. E., Wenatchee, Wash.
Hutchinson, R. Raymond, 1115 Highland Boulevard, Pittsburgh, Pa.
Hutchinson, T. C., Decorah, Iowa.
Hutchinson, Walter G., Eve bldg., Nashville, Tenn.

Ignalls, R. E., care of Surgeon-general's Office, Washington, D. C.
Irwin, Alphonso, 425 Cooper st., Camden, N. J.
Irwin, Chas. S., Vancouver, Wash.

Jack, Chas. S., 1533 Locust st., Philadelphia, Pa.
Jackman, W. T., 809 Schofield bldg., Cleveland, Ohio.
*Jackson, A. M., Lakeland, Fla.
*Jackson, A. M., Macon, Ga.
Jackson, H. H., 317 Jefferson ave., Detroit, Mich.
Jackson, J. S., 512 California bldg., Denver, Colo.
Jackson, Victor H., 40 E. 41st st., New York, N. Y.
Jackson, Walter H., 126 S. Main st., Ann Arbor, Mich.
Jameson, G. L. S., 1429 Spruce st., Philadelphia, Pa.
Jarvie, Wm., 105 Clinton st., Brooklyn, N. Y.
Jefferis, C. R., New Century bldg., Wilmington, Del.
Jernigan, G. F., 61 W. 56th st., New York, N. Y.
Jessup, A. A., Boise, Idaho.
Jewell, Albert B., 429 Center st., Newton, Mass.
Jiménez, J. Salgado, San Juan, Porto Rico.
Johnson, C. N., Marshall Field bldg., Chicago, Ill.
*Johnson, E. A., 706 Exchange bldg., Memphis, Tenn.
*Johnson, F. A., Sheffield, Ala.
*Johnson, H. H., Macon, Ga.
*Jonas, I., Mobile, Ala.
*Jones, Bush, Dallas, Texas.
Jones, C. F., 110 Madison ave., Elizabeth, N. J.
Jones, L. D., Grant bldg., San Diego, Cal.
*Jones, R. H., Winston, N. C.
Jones, Victor S., Bethlehem, Pa.
Jones, W. I., Columbus, Ohio.
*Jordan, J. D., Little Rock, Ark.
*Jordan, J. R., Macon, Ga.
Jordon, M. E., 712 Wright & Callender bldg., Los Angeles, Cal.
Junkerman, G. S., 231 W. Court st., Cincinnati, Ohio.

Keith, E. Grace, 810 Corbett bldg., Portland, Ore.
*Kelley, A. B., Yazoo City, Miss.
Kelley, Henry A., 727 Congress st., Portland, Maine.
Kelsey, Harry E., 817 Park ave., Baltimore, Md.
Kennerly, J. H., 2645 Locust st., St. Louis, Mo.
Ketcham, A. H., 623 Mack bldg., Denver, Colo.
*Kettig, E. M., 318 W. Walnut st., Louisville, Ky.
Keyt, W. B., 508-9 Mack bldg., Denver, Colo.
Kimball, C. O., 27 W. 38th st., New York N. Y.

King, Otto M., 30 S. Jefferson st., Huntington, Ind.
Kingsbury, Addison, Columbus, Ohio.
Kirk, Edward C., Lock Box 1615, Philadelphia, Pa.
*Knapp, J. Rollo, 114 Dauphine st., New Orleans, La.
Knight, Eugene W., Bellows Falls, Vt.
Koch, C. R. E., 87 Lake st., Chicago, Ill.
Kremer, F. B., 407 Masonic Temple, Minneapolis, Minn.
Kreppel, C. F., 10 Hyde Park ave., Forest Hills, Mass.
Krupp, P. C., First Nat'l Bank bldg., Houston, Texas.

*Lambright, W. E., Atlanta, Ga.
Landry, J. H., 830 Canal st., New Orleans, La.
Lauderdale, C. E., Fort Logan, Colo.
Laughlin, V. W., Victor, Colo.
Lawrence, C. R., Enid, Okla.
*Lawson, A. Greensboro, Ala.
Laymen, G. D., 5642 E. Washington st., Indianapolis, Ind.
Layton, Robert E., 1311 Wisconsin ave., Washington, D. C.
Leak, W. H., Watertown, N. Y.
LeCron, D. O. M., 501 Missouri Trust bldg., St. Louis, Mo.
Lee, Alfred P., 1728 Chestnut st., Philadelphia, Pa.
Leete, R. H., Prestonburg, Ky.
Lemley, L. G., Grinnell, Iowa.
Lentz, J. A., Phœnix, Ariz.
Lenzen, E. J., Webster Groves, Mo.
*Leonard, W. C., Nashville, Tenn.
LeRoy, L. C., 47 W. 50th st., New York, N. Y.
Lewis, O. G. L., 1529 Locust st., Philadelphia, Pa.
*Leyden, F. C., Anniston, Ala.
Libbey, J. A., 635 Fulton bldg., Pittsburgh, Pa.
Lindstrom, Carl R., 419 Boylston st., Boston, Mass.
Link, E. G., 226 Cutler bldg., Rochester, N. Y.
Linton, Chas. C., 12 W. 46th st., New York, N. Y.
Lippincott, J. Thos., 1433 Walnut st., Philadelphia, Pa.
Lischer, B. E., 504 Humboldt bldg., St. Louis, Mo.
Litch, W. F., 31 Simpson road, Ardmore, Pa.
Littig, M. D., 419 Boylston st., Boston, Mass.
Livingston, B. E., Chanute, Kans.
Lodge, E. Ballard, 432 Rose bldg., Cleveland, Ohio.
Loeffler, Egbert T., 705 S. State st., Ann Arbor, Mich.
Logan, W. H. G., 5606 Winthrop ave., Chicago, Ill.
*London, Jno. H., 926 Farragut square, Washington, D. C.
Long, S. A., McAlester, Okla.
Lord, S., Telluride, Colo.
*Lorenz, J. H., Fourth Nat'l Bank bldg., Atlanta, Ga.
*Lovelace, G. R., Waycross, Ga.
Loveland, T. O., 196 Marlboro st., Boston, Mass.
Lowe, F. W., 52 N. Pearl st., Buffalo, N. Y.
Lowell, W. H., Lancaster, Pa.
Luckey, B. F., 88 Broadway, Paterson, N. J.
*Luckie, L. F., 830 S. 20th st., Birmingham, Ala.
Luckie, S. B., 333 E. Broad st., Chester, Pa.
*Lundy, W. E., Memphis, Tenn.

MacKay, Gordon R., 333 Commonwealth ave., Boston, Mass.
*McAfee, S. H., Maison Blanche, New Orleans, La.
*McAnnally, F. H., Jasper, Ala.
McCall, J. O., 488 Franklin st., Buffalo, N. Y.
McCay, D. H., 899 Main st., Buffalo, N. Y.
McClenahan, J. T., 926 Farragut sq., Washington, D. C.
McCluer, Fr. W., Lexington, Va.
McClure, John H., Wheeling, W. Va.
McCorley, C. M., Abilene, Texas.
McFadden, H. B., 3505 Hamilton st., Philadelphia, Pa.
McGee, R. P., 605 Mack bldg., Denver, Colo.
McGehee, W. H. O., Ohio College of Dental Surgery, Cincinnati, Ohio.
McLaurin, L. B., Natchez, Miss.
McManus, Chas., 80 Pratt st., Hartford, Conn.
McManus, Henry, 80 Pratt st., Hartford, Conn.
McManus, Jas., 80 Pratt st., Hartford, Conn.
McMillen, D. J., 11th and Locust sts., Kansas City, Mo.
Mann, A. E., Findlay, Ohio.
Marks, A. L., 924 Leonard ave., St. Louis, Mo.
Marlow, G. C., Lancaster, Wis.
*Marlowe, Searcy, Tuscaloosa, Ala.

MARSHALL, F. L., 39 Fairfield st., Boston, Mass.
MARSHALL, J. P., 7401 Hazel ave., St. Louis, Mo.
MARSHALL, J. S., The Carlton, Berkeley, Cal.
*MASON, J. M., Macon, Ga.
*MASON, R. HOLMES, Macon, Ga.
*MASON, W. G., Tampa, Fla.
MASON, W. M., Berkeley, Cal.
*MASSEY, D. L., Birmingham, Ala.
MAY, E. A., Jackson, Miss.
MAYTUM, B. J., Paulinna, Iowa.
*MEADORS, JOS. T., 625½ Church st., Nashville, Tenn.
MEGUIAR, C. W., Munfordville, Ky.
MEISBURGER, LOUIS, 85 N. Pearl st., Buffalo, N. Y.
*MELENDY, A. R., 1 Deaderick bldg., Knoxville, Tenn.
*MERCHANT, M. S., 310 Mason bldg., Houston, Texas.
*MERRILL, C. A., Birmingham, Ala.
MERRIMAN, A. F., JR., Bank of Savings bldg., Oakland, Cal.
MERRITT, A. H., 59 W. 46th st., New York, N. Y.
MESSERSCHMITT, FREDERICK, 1023 Granite bldg., Rochester, N. Y.
*METCALF, J. L., Mexia, Texas.
MEYER, J. H., 163 W. 71st st., New York, N. Y.
*MEYERS, S. M., Cleburne, Texas.
MILAM, C. K., Paducah, Ky.
*MILAM, T. M., Little Rock, Ark.
MILLBERRY, G. S., 1104 Sutter st., San Francisco, Cal.
MILLER, GEO. W., Citizens' Nat'l Bank bldg., Des Moines, Iowa.
MILLER, HERBERT C., 15th and Couch sts., Portland, Ore.
*MILLER, W. C., Augusta, Ga.
MILLS, C. W., Chillicothe, Ohio.
MILLS, EDWARD C., 16 S. 3d st., Columbus, Ohio.
MITCHELL, L. D., Arkansas City, Kans.
MOFFATT, G. S., Pittsburg, Kans.
MOFFITT, JOHN J., 200 Pine st., Harrisburg, Pa.
MOLT, FREDK. F., Pullman, Chicago, Ill.
MONROE, C. A., Boulder, Colo.
*MONROE, W. D., 3104 "N" st., N. W., Washington, D. C.
*MOORE, T. T., JR., Columbia, S. C.
MOREHOUSE, H. L., Spokane, Wash.
*MORGAN, HENRY W., 211 N. High st., Nashville, Tenn.
MOSKAU, GILBERT, Mayville, N. D.
*MURDAUGH, L. E., Celeste, Tex.
MURRAY, W. N., 601 Medical Block, Minneapolis, Minn.
MYERS, CHAS. W., Montpelier, Ohio.

*NANCE, C. L., Tampa, Fla.
NEIL, C. H., Fairmount, W. Va.
NELSON, A. C., Lincoln Dental College, Lincoln, Nebr.
NELSON, J. J., 330 S. 15th st., Philadelphia, Pa.
NEWELL, A. W., 115 S. Grant ave., Columbus, Ohio.
NEWKIRK, GARRETT, 501 Slavin bldg., Pasadena, Cal.
*NISBET, L. G., Aberdeen, Miss.
NOBLE, S. S., Wichita, Kans.
NODINE, A. M., 134 Fort Greene Place, Brooklyn, N. Y.
*NOEL, L. G., 527½ Church st., Nashville, Tenn.
NONES, R. H., 1708 Chestnut st., Philadelphia, Pa.
NOYES, EDMUND, 1108 Stewart bldg., Chicago, Ill.
NOYES, FRED. B., 1428 People's Gas bldg., Chicago, Ill.
NYCE, J. E., 731 Witherspoon bldg., Philadelphia, Pa.
NYMAN, J. E., Venetian bldg., Chicago, Ill.

O'CONNELL, F. E., 700 Cobb bldg., Seattle, Wash.
*OHME, B. H., Alexander City, Ala.
OLIVER, R. T., care of Surgeon-general's Office, Washington, D. C.
ORR, A. W., 1721 S. 20th st., Lincoln, Neb.
*ORR, J. M., Union Springs, Ala.
OSBORN, JOS. D., Atlanta, Ga.
OTTOLENGUI, R., 80 W. 40th st., New York.
OWEN, E. A., Salida, Colo.
OWENS, F. M., 416 New York Life bldg., St. Paul, Minn.
OWRE, ALFRED, 1700 Portland ave., Minneapolis, Minn.

PAGE, W. E., 38 W. Newton st., Boston, Mass.
PALMER, B. W., 232 Union ave., Rochester, N. Y.
PALMER, G. B., 58 W. 47th st., New York.

PALMER, STEPHEN, 272 Mills st., Poughkeepsie, N. Y.
PARKHURST, C. E., 79 Walnut st., Somerville, Mass.
PARSONS, STARR, 1309 "L" st., N. W., Washington, D. C.
PATTERSON, J. D., Keith & Perry bldg., Kansas City, Mo.
*PATTON, A. W., Tuscaloosa, Ala.
PEARSON, J. A., Barton, Vt.
PECK, A. H., 92 State st., Chicago, Ill.
PENDLETON, I. E., 129 Lisbon st., Lewiston, Me.
*PETERSON, J. A., Tifton, Ga.
PETTIBONE, E. L., 5813 Franklin st., N. W., Cleveland, Ohio.
PFEIFER, JOSEPHINE D., 1007 Masonic Temple, Chicago, Ill.
PIPER, J. R., 179 Newbury st., Boston, Mass.
PLATT, F. L., 710 Elkan Gunst bldg., San Francisco, Cal.
PORTER, H. J., Cambridge, Neb.
POTTER, W. H., 16 Arlington st., Boston, Mass.
*POUND, E. H., Jacksonville, Fla.
POVALL, W. H., Mt. Morris, N. Y.
POWELL, C. B., Jacksonville, Ill.
PRICE, A. B., 14-15 The Colonial, Richmond, Ind.
*PRICE, L. B., Corinth, Miss.
PRICE, W. A., 10406 Euclid ave., Cleveland, Ohio.
PROSSER, A. J., 3901 Westminster Place, St. Louis, Mo.
PROSEUS, F. W., 270 Monroe ave., Rochester, N. Y.
PRUYN, C. P., 108 N. State st., Chicago, Ill.
PULLEN, H. A., 722 Main st., Buffalo, N. Y.
PULLEN, R. N., 624 Mack bldg., Denver, Colo.
PURCELL, L. E., Kansas City, Mo.
PURSELL, F. M., Tippecanoe City, Ohio.

*QUATTLEBAUM, E. G., Columbia, S. C.
QUICK, R. C., 306 Temple Court, Denver, Colo.

*RAMAGE, L. J., Decatur, Ala.
*RAY, H. J., Aiken, S. C.
RAYMOND, H. C., 1040 Majestic bldg., Detroit, Mich.
*REABEN, W. H., McComb City, Miss.
REDMOND, H. H., 221 Mack bldg., Denver, Colo.
*REESE, GEO. W., Birmingham, Ala.
*REEVES, A. T., Selma, Ala.
*REGAN, C. W., Laurinburg, N. C.
REGISTER, H. C., 1907 Chestnut st., Philadelphia, Pa.
REID, C. B., Topeka, Kans.
*REID, J. G., Marion, N. C.
REITZ, R. B., 576 Fifth ave., New York, N. Y.
*REMBERT, G. W., New Orleans, La.
REMINGTON, F. A., 57 W. 49th st., New York, N. Y.
*RENALDS, W. R., Salem, Va.
RETTICH, HUGO, 52 W. 68th st., New York, N. Y.
RHEIN, MEYER L., 38 E. 61st st., New York, N. Y.
*RICH, CELIA, Jackson bldg., Nashville, Tenn.
*RICH, S. L., Jackson bldg., Nashville, Tenn.
*RICHARDSON, W. C., New Orleans, La.
RICHTER, R. G., 128 Wisconsin st., Milwaukee, Wis.
RIDER, T. T., Missoula, Mont.
ROBERTS, H. E., 1516 Locust st., Philadelphia, Pa.
ROBERTS, NORMAN J., "The Gables," Waukegan, Ill.
*ROBERTSON, L. P., Martin, Texas.
ROBINSON, R. D., 702 Grant bldg., Los Angeles, Cal.
RODGERS, CHAS. W., 165 Harvard st., Dorchester, Mass.
ROE, F. A., Tama bldg., Burlington, Iowa.
ROE, W. J., 1210 Locust st., Philadelphia, Pa.
*ROSE, E. D., Bowling Green, Ky.
ROSE, J. E., Hermiston, Ore.
ROSENTHAL, D. A., 4032 Jenkins Arcade bldg., Pittsburgh, Pa.
ROSS, A. O., 807 N. High st., Columbus, Ohio.
ROSS, JOHN F., 2 College st., Toronto, Canada.
ROSSTEUSCHER, C. F., Yankton, S. D.
*ROUX, R. H., Savannah, Ga.
RUGGLES, S. D., Security Bank bldg., Portsmouth, Ohio.
RUHLIN, CHAS. A., Mt. Gilead, Ohio.
RUSH, E. G., 605 Commerce bldg., Kansas City, Mo.
RUST, THOS. L., 1408 "L" st., N. W., Washington, D. C.
*RUTLEDGE, B., Lock Box 45, Florence, S. C.

SACH, JOS. Y., Kansas City, Mo.
*SARRAZIN, J. J., Godchaux bldg., New Orleans, La.
SAVAGE, G. E., 14 Knowles bldg., Worcester, Mass.

SCHAMBERG, MORRIS I., 57 W. 58th st., New York, N. Y.
*SCHERER, W. H., Houston, Texas.
SCHLEGEL, G. S., 147 N. 8th st., Reading, Pa.
SCHMIDT, J. A., 1195 Dean st., Brooklyn, N. Y.
SCHUHMANN, HENRY H., 1312 Columbus Memorial bldg., Chicago, Ill.
SEARLES, C. S., 100 State st., Chicago, Ill.
SEARS, B. A., 847 Main st., Hartford, Conn.
SECRIST, M. V., Alpena, Mich.
SEDGWICK, W. H., Newark, Ohio.
SEIP, HOWARD S., 721 Walnut st., Allentown, Pa.
*SELF, J. R., Lincolnton, N. C.
SELLERS, CHAS. J., Fredonia, Pa.
SEMANS, H. M., 106 E. Broad st., Columbus, Ohio.
SHARP, G. C., Pasadena, Cal.
SHARP, JAS. G., Butler bldg., San Francisco, Cal.
*SHARP, S. P., Deaderick bldg., Knoxville, Tenn.
SHARP, W. F., Union Square bldg., San Francisco, Cal.
SHAW, F. I., 1000 Cobb bldg., Seattle, Wash.
*SHERRILL, R. G., Raleigh, N. C.
SHIELDS, NELSON T., 61 W. 56th st., New York, N. Y.
SHOBE, B. L., Bartlesville, Okla.
SHOREY, E. A., Masonic Temple, Dover, N. H.
SHRYOCK, WM. W., 129 W. Berry st., Ft. Wayne, Ind.
SHUMAN, HARRY B., 168 Newbury st., Boston, Mass.
SIBLEY, W. E., 218 Bradbury bldg., Los Angeles, Cal.
SIDDALL, W. A., 1102 New England ave., Cleveland, Ohio.
SIEFKIN, C. WESLEY, Rolfe, Iowa.
*SIMMONS, J. J., Kirbyville, Tex.
SIMPSON, O. H., Dodge City, Iowa.
*SIMPSON, R. L., "The Franklin," 301 E. Franklin st., Richmond, Va.
*SLATER, W. K., Empire bldg., Knoxville, Tenn.
SMEDLEY, V. C., 604 California bldg., Denver, Colo.
SMEDLEY, WM., 604 California bldg., Denver, Colo.
SMEDLEY, W. P., 604 California bldg., Denver, Colo.
*SMITH, B. HOLLY, 1007 Madison ave., Baltimore, Md.
*SMITH, C. L., Pensacola, Fla.
SMITH, D. D., Sandusky, Ohio.
SMITH, D. D., 1629 Walnut st., Philadelphia, Pa.
SMITH, EDGAR W., Little Rock, Ark.
SMITH, EUGENE H., 283 Dartmouth st., Boston, Mass.
SMITH, G. MARSHALL, 1009 Madison ave., Baltimore, Md.
SMITH, H. A., 116 Garfield Place, Cincinnati, Ohio.
SMITH, H. T., 3000 Vernon Place, Cincinnati, Ohio.
SMITH, J. ALLEN, 232 N. Tryon st., Colorado Springs, Colo.
*SMITH, J. M., Houston, Miss.
*SMITH, JULIAN, Austin, Texas.
SMITH, KARL C., 576 Fifth ave., New York, N. Y.
*SMITH, L. A., Savannah, Ga.
*SMITH, L. A., Port Gibson, Miss.
SMITH, M. C., 3 Lee Hall, Lynn, Mass.
SMITH, O. L., Fort Collins, Colo.
SMITH, R. R., 608 26th st., Denver, Colo.
SMITH, W. P., 4710 Central ave., Cleveland, Ohio.
SMITH, W. W., 63 East ave., Rochester, N. Y.
SOLECKI, J. H., 715 Kansas ave., Topeka, Kans.
SOUTHWELL, CHAS. C., 409 Goldsmith bldg., Milwaukee, Wis.
SPIES, W. F., 1 Union Square, New York, N. Y.
*SPURGEON, J. S., Hillsboro, N. C.
STANLEY, J. W., Wilmington, N. C.
STANLEY, NED A., 3 Pleasant st., New Bedford, Mass.
STANSBURY, C. J., 618 Cobb bldg., Seattle, Wash.
STANWOOD, H. D., Alamosa, Colo.
*STAPLES, G. W., Dallas, Texas.
STARKWEATHER, C. S., Bellaire, Ohio.
STARR, A. R., 10 E. 92d st., New York, N. Y.
STEEVES, ALICE M., Dental Hospital, Boston, Mass.
STELLWAGEN, THOS. C., 1119 Spruce st., Philadelphia, Pa.
STEPHAN, JNO. F., 1016 New England bldg., Cleveland, Ohio.
STERN, DAVID, 108 Garfield Place, Cincinnati, Ohio.
STEVENSON, WM. G., Morenci, Mich.
*STEWART, H. T., Memphis Trust bldg., Memphis, Tenn.

*Stiff, F. W., 600 E. Grace st., Richmond, Va.
Stiff, John P., Fredericksburg, Va.
Sting, E. H., Tiffin, Ohio.
Stockton, C. S., 22 Central ave., Newark, N. J.
*Storey, J. E., Beaumont, Texas.
Strang, C. W., Sanford bldg., Bridgeport, Conn.
Strang, Robt. H. W., Bridgeport, Conn.
Street, H. Hayward, 324 N. Charles st., Baltimore, Md.
Stutenroth, C. E., Redfield, S. D.
Suggett, A. H., Butler bldg., San Francisco, Cal.
Sullivan, H. H., 420 Altman bldg., Kansas City, Mo.
Summa, Richard, 410 Metropolitan bldg., St. Louis, Mo.
Summerlin, M. F., Athens, Ga.
Sweeney, E. S., Osakis, Minn.
Swift, A. L., 140 W. 57th st., New York.
Swift, Thos. C., 1 Park ave., Mt. Vernon, N. Y.
Swinhagen, H. D., Napoleon, Ohio.
Swing, R. H. D., 1623 Walnut st., Philadelphia, Pa.

*Talbot, W. O., Fort Worth, Texas.
*Taylor, C. H., 52 N. 2d st., Memphis, Tenn.
Taylor, F. E., Malone, N. Y.
Taylor, F. T., 419 Boylston st., Boston.
Taylor, L. C., 68 Pratt st., Hartford, Conn.
*Taylor, W. W., Danville, Ky.
*Teague, N. A., Augusta, Ga.
Teter, Chas. K., 946 Rose bldg., Cleveland, Ohio.
Teter, Wm. C., 946 Rose bldg., Cleveland, Ohio.
Thatcher, C. A., Kingsville, Ashtabula co., Ohio.
*Thielen, B. F., Paris, Texas.
Thomas, E. A., Red Cloud, Neb.
Thomas, J. D., 1126 Spruce st., Philadelphia, Pa.
Thompson, C. N., 3017 Michigan ave., Chicago, Ill.
Thompson, H. C., 1113 Pennsylvania ave., Washington, D. C.
*Thompson, J. W., Humboldt, Tenn.
Thompson, O. A., Hillsboro, Ohio.
Thorpe, Burton Lee, 3605 Lindell Boulevard, St. Louis, Mo.
Tibbetts, T. E., Rockland, Me.
*Tignor, G. S., Century bldg., Atlanta, Ga.
Tileston, H. B., 314 Equitable bldg., Louisville, Ky.
*Tison, G. B., Gainsville, Fla.
*Towner, J. D., Memphis Trust bldg., Memphis, Tenn.
Tracy, M. C., 46 W. 51st st., New York, N. Y.
Tracy, W. D., 46 W. 51st st., New York, N. Y.
Trostel, H. E., York, Pa.
Trueman, W. H., 900 Spruce st., Philadelphia, Pa.
Truman, James, 4505 Chester ave., Philadelphia, Pa.
Turner, C. R., 1500 Locust st., Philadelphia, Pa.
*Turner, M. E., 719 Grant bldg., Atlanta, Ga.
Turner, T. E., 606 Chemical bldg., St. Louis, Mo.
Turner, V. E., Raleigh, N. C.
*Tuttle, M. H., Montgomery, Ala.

Ulsaver, Ervin S., New Rochelle, N. Y.

Van Buskirk, W. L., 202 Traders' Nat'l Bank bldg., Scranton, Pa.
*Vann, G. S., Gadsden, Ala.
*Vann, N. N., Attalla, Ala.
Van Stratum, F. G., Hurley, Wis.
Van Vleck, Chas. K., 536 Warren st., Hudson, N. Y.
Varley, E. W., Pueblo, Colo.
Vaughan, E. K., Denver, Colo.
*Vignes, C. V., Macheca bldg., New Orleans, La.
Voyles, S. H., 306 Humbolt bldg., St. Louis, Mo.

Waddell, J. H., 205 Mack bldg., Denver, Colo.
*Wahl, J. P., New Orleans, La.
Walker, A. J., 33 Main st., Bridgeton, Me.
Walker, A. S., 295 Central Park W., New York, N. Y.
Walker, F. C., 309 State st., Brooklyn, N. Y.
*Walker, H. W., Macon, Ga.
*Walker, J. L., 505 Taylor bldg., Norfolk, Va.
Walker, L. J., Grafton, W. Va.
*Walker, R. H., 231 Main st., Norfolk, Va.
*Walker, W. E., 157 Baronne st., New Orleans, La.
Walker, W. W., 58 N. 50th st., New York, N. Y.
Wallace, J. H., Omaha, Nebr.

WALLING, GEO. H., Machias, Me.
WARD, MARCUS L., 703 University ave., Ann Arbor, Mich.
WARNER, C. B., Urbana, Ill.
WARNER, E. R., 401 California bldg., Denver, Colo.
WARNER, G. R., 417 N. 7th st., Grand Junction, Colo.
WARREN, E. F., Central City, Colo.
WARREN, HORACE, Missouri Valley, Iowa.
WATERS, T. S., 756 Eutaw st., Baltimore, Md.
*WATKINS, J. C., Winston, N. C.
WATKINS, S. E., Wilson Co. Bank bldg., Lebanon, Tenn.
WATSON, A. C., 24 Masonic Temple, Denver, Colo.
WATSON, C. L., Mexia, Texas.
WATTS, CLARENCE V., Good bldg., Des Moines, Iowa.
WEAVER, A. MARSHALL, 618 Rose bldg., Cleveland, Ohio.
WEBER, A. G., 1 Corales, Havana, Cuba.
WEBSTER, F. S., Carthage, Mo.
WEDELSTAEDT, E. K., 204 New York Life bldg., St. Paul, Minn.
WEEKS, S. MERRILL, 1429 Spruce st., Philadelphia, Pa.
*WEICHSELBAUM, WM., Savannah, Ga.
WELCH, G. B., 1420 New York ave., N. W., Washington, D. C.
WELCH, J. D., New Hampton, Iowa.
WELLS, W. D., Macon, Ga.
WENDELL, W. C., 708 Goldsmith bldg., Milwaukee, Wis.
WENKER, RAYMOND J., 418 Camp bldg., Milwaukee, Wis.
WEST, G. N., 100 State st., Chicago, Ill.
WESTERFIELD, T. L., 320 Linz bldg., Dallas, Texas.
*WESTMORELAND, W. W., Columbus, Miss.
WHEELER, HERBERT L., 560 Fifth ave., New York, N. Y.
*WHEELER, J. H., Greensboro, Ala.
WHERRY, A. C., Salt Lake City, Utah.
WHERRY, J. G., Elyria, Ohio.
WHERRY, S. W., Ogden, Utah.
WHIPPLE, E. O., Olean, N. Y.
WHITE, EDWARD P., 1654 Massachusetts ave., Cambridge, Mass.
WHITE, F. D., 804 Masonic Temple, Minneapolis, Minn.
WHITE, GORDON, 610½ Church st., Nashville, Tenn.
WHITE, PAUL G., 419 Boylston st., Boston, Mass.
WHITE, W. A., Phelps, N. Y.
WHITMORE, Y. E., 23–25 Mann bldg., Little Rock, Ark.
WHITNEY, A. L., 623 Commonwealth bldg., Denver, Colo.
WHITSLAR, W. H., 700 Schofield bldg., Cleveland, Ohio.
WILLIAMS, G. T., 1100 Cobb bldg., Seattle, Wash.
*WILLIAMS, J. G., Atlanta, Ga.
WILLIAMS, J. T., 2900 Lake Place, Denver, Colo.
WILLIAMS, P. H., Ashland, Ky.
*WILLIAMSON, N. A., Prince st., Knoxville, Tenn.
WILSON, C. S., Lamar, Colo.
*WILSON, F. C., 114½ Jones st., Savannah, Ga.
WILSON, GEO. H., 701 Schofield bldg., Cleveland, Ohio.
WILSON, G. Y., Colorado Springs, Colo.
WILSON, HARRIS R. C., 701 Schofield bldg., Cleveland, Ohio.
WINN, J. W., 217½ Fifth ave., Nashville, Tenn.
WOMACHKA, E. A., 4202 Clarke ave., S. W., Cleveland, Ohio.
*WOMACK, C. T., Box 234, Martinsville, Va.
WOODBURY, CHAS. E., Council Bluffs, Iowa.
WOODBURY, FRANK, 192 Pleasant st., Halifax, Nova Scotia.
WORK, C. M., Ottumwa, Iowa.
WRIGHT, C. D., 57 W. 50th st., New York, N. Y.
WRIGHT, FR. L., Wheeling, W. Va.
*WRIGHT, P. H., Oxford, Miss.
*WRIGHT, T. B., Hattiesburg, Miss.
*WRIGHT, W. R., Century bldg., Jackson, Miss.
*WYATT, T. M., Bentonville, Ark.

YOUNG, D. H., Attica, N. Y.
YOUNG, J. LOWE, 571 Fifth ave., New York, N. Y.
YOUNG, L. A., 4633 Maryland ave., St. Louis, Mo.

ZARBAUGH, LYMAN L., Toledo, Ohio.
ZERFING, WILSON, 700 Perry bldg., Philadelphia, Pa.
*ZIRKLE, W. M., English-American bldg., Atlanta, Ga.

PERMANENT MEMBERS WITHOUT DUES.

The following members are "permanent without payment of dues," under Standing Resolution No. 10, by virtue of having been in reputable practice for a period of fifty years:

CHASE, EMMA EAMES, 3334 Washington ave., St. Louis, Mo.

FIELD, GEO. L., 4 Adams ave., W., Detroit, Mich.

HOLMES, E. S., New Aldrich bldg., Grand Rapids, Mich.

LITCH, WILBUR F., Philadelphia, Pa.

LYMAN, A. E., Melbourne, Fla.

PALMER, CORYDON, Warren, Ohio.

RICH, JOHN B., New York, N. Y.

TRUMAN, JAS., 4505 Chester ave., Philadelphia, Pa.

TURNER, V. E., Raleigh, N. C.

Surviving Charter Members of the Southern Dental Association.

The following surviving charter members of the Southern Dental Association are also "permanent members without dues":

AUGSPATH, LOUIS, Little Rock, Ark.

CARPENTER, L. D., Atlanta, Ga.

COLE, W. T., Newman, Ga.

COOKE, W. H., Denton, Texas.

GORGAS, F. J. S., 259 N. Eutaw st., Baltimore, Md.

LOWRANCE, H. A., Athens, Ga.

MARSHALL, E. B., Rome, Ga.

MCDONALD, R. H., Griffin, Ga.

RAMBO, SAMUEL, Montgomery, Ala.

PAST PRESIDING OFFICERS.

I. PRIOR TO CONSOLIDATION.

Ex-Presidents American Dental Association.

1859. *W. W. Allport, Chicago, Ill.
First meeting, for organization.
1860. *W. H. Atkinson, Cleveland, Ohio.
1861. (No meeting.)
1862. *George Watt, Xenia, Ohio.
1863. *W. H. Allen, New York, N. Y.
1864. *J. H. McQuillen, Philadelphia, Pa.
1865. *C. W. Spalding, St. Louis, Mo.
1866. *C. P. Fitch, New York, N. Y.
1867. *A. Lawrence, Lowell, Mass.
1868. *Jonathan Taft, Cincinnati, Ohio.
1869. *Homer Judd, St. Louis, Mo.
Owing to a change in the constitution, officers elected at this and the sessions following served at the annual meeting subsequent to their election.
1870. *W. H. Morgan, Nashville, Tenn.
1871. *Geo. H. Cushing, Chicago, Ill.
1872. *P. G. C. Hunt, Indianapolis, Ind.
1873. *T. L. Buckingham, Philadelphia, Pa.
1874. *M. S. Dean, Chicago, Ill.
1875. *A. L. Northrop, New York, N. Y.
1876. *Geo. W. Keeley, Oxford, Ohio.
1877. *F. H. Rehwinkel, Chillicothe, Ohio.
1878. *H. J. McKellops, St. Louis, Mo.
1879. *L. D. Shepard, Boston, Mass.
1880. *C. N. Peirce, Philadelphia, Pa.
1881. H. A. Smith, Cincinnati, Ohio.
1882. *W. H. Goddard, Louisville, Ky.
1883. E. T. Darby, Philadelphia, Pa.
1884. J. N. Crouse, Chicago, Ill.
1885. *W. C. Barrett, Buffalo, N. Y.
1886. *W. W. Allport, Chicago, Ill.
1887. *Frank Abbott, New York, N. Y.
1888. C. R. Butler, Cleveland, Ohio.
1889. M. W. Foster, Baltimore, Md.
1890. *A. W. Harlan, Chicago, Ill.
1891. W. W. Walker, New York, N. Y.
1892. J. D. Patterson, Kansas City, Mo.
1893. (Formal session only, owing to the holding of the World's Columbian Dental Congress; officers elected in 1892 holding over until 1894.)
1894. *J. Y. Crawford, Nashville, Tenn.
1895. *J. Y. Crawford, Nashville, Tenn.
1896. James Truman, Philadelphia, Pa.

Ex-Presidents Southern Dental Association.

1869. *W. T. Arrington, Memphis, Tenn.
First meeting for organization; Jas S. Knapp being chairman *pro tem.*
1870. *W. T. Arrington, Memphis, Tenn.
1871. *Jas. S. Knapp, New Orleans, La.
1872. *F. Y. Clark, Savannah, Ga.
1873. *H. M. Grant, Abingdon, Va.
1874. *Robert Arthur, Baltimore, Md.
1875. *J. R. Walker, New Orleans, La.
1876. *W. T. Arrington, Memphis, Tenn.
1877. *W. G. Redmund, Louisville, Ky.
1878. S. J. Cobb, Nashville, Tenn.
1879. F. J. S. Gorgas, Baltimore, Md.
1880. *J. B. Patrick, Charleston, S. C.
1881. V. E. Turner, Raleigh, N. C.
1882. E. S. Chisholm, Atlanta, Ga.
1883. L. D. Carpenter, Atlanta, Ga.
1884. *H. J. McKellops, St. Louis, Mo.
1885. *A. O. Rawls, Lexington, Ky.
1886. *W. C. Wardlaw, Augusta, Ga.
1887. *W. W. H. Thackston, Farmville, Va.
1888. *B. H. Catching, Atlanta, Ga.
1889. *J. Y. Crawford, Nashville, Tenn.
1890. *John C. Storey, Dallas, Tex.
1891. G. F. S. Wright, Georgetown, S. C.
1892. Gordon White, Nashville, Tenn.
1893. B. Holly Smith, Baltimore, Md.
1894. (Same officers held over.)
1895. *H. E. Beach, Clarksville, Tenn.
1896. John S. Thompson, Atlanta, Ga.
1897. W. H. Richards, Knoxville, Tenn.

* Deceased.

II. SINCE CONSOLIDATION.

Ex-Presidents National Dental Association.

1897. *Thomas Fillebrown, Boston, Mass.
1898. Harvey J. Burkhart, Batavia, N. Y.
1899. B. Holly Smith, Baltimore, Md.
1900. G. V. Black, Chicago, Ill.
1901. J. A. Libbey, Pittsburgh, Pa.
1902. L. G. Noel, Nashville, Tenn.
1903. *C. C. Chittenden, Milwaukee, Wis.
1904. Waldo E. Boardman, Boston, Mass.
1905. M. F. Finley, Washington, D. C.
1906. A. H. Peck, Chicago, Ill.
1907. William Carr, New York, N. Y.
1908. V. E. Turner, Raleigh, N. C.
1909. Burton Lee Thorpe, St. Louis, Mo.
1910. Edward S. Gaylord, New Haven, Conn.

* Deceased.

Constitution of the National Dental Association.

PREAMBLE.

We, the members of the American Dental Association and of the Southern Dental Association, do declare ourselves a Society to cultivate the Science of Dentistry, and have adopted the following Constitution and Rules of Order for our government:

CONSTITUTION.

(Adopted at Old Point Comfort, August 5, 1897. Revised and amended at Asheville, N. C., August, 1903.)

ARTICLE I.

NAME.

This organization shall be known by the name of the National Dental Association.

ARTICLE II.

OBJECT.

The object of this Association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them a mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession.

ARTICLE III.

MEMBERS TO BE OF THREE CLASSES.

Section 1. The members of this Association shall be of three classes, viz, permanent, delegate, and honorary members; the two former classes having equal rights and privileges, except that none but permanent members shall be eligible to office.

PERMANENT MEMBERS.

Sec 2. Permanent members shall consist of those who, coming as delegates and complying with the requirements of the Association, shall sign a statement in a book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership.

DELEGATE MEMBERS.

Sec. 3. All members shall be practitioners of dentistry. They shall be received only from permanently organized state dental societies. They shall be elected by ballot at some regular meeting of their society, and shall be members who have done some meritorious work for the profession; but no person shall be received as a delegate who is in arrears for dues to this Association.

Sec. 4. Honorary members shall consist of prominent, worthy members of the dental profession, residing in foreign countries, who shall be elected by ballot.

Sec. 5. It is hereby specially provided that all persons at present permanent members of the American Dental Association and of the Southern Dental Association are permanent members of this Association, and entitled to all the privileges of the class to which they belong, without further action, and the Treasurer is hereby directed to transcribe their names upon the roll of membership of this Association.

ARTICLE IV.

DELEGATES FROM STATE SOCIETIES.

Section 1. That delegates may be received from any state society, district society, or local society affiliated with the state society, upon the certificate of the president and secretary of the state society, and that these

delegates may become members by sending their certificate together with the fee to the Treasurer of the National Dental Association.

SEC. 2. Each delegate shall present credentials which shall be approved by the Executive Committee.

SEC 3. If the Committee on Credentials has knowledge that any applicants for membership are violating the Code of Ethics, said applicants shall not be received, but shall be referred by the committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code except the violator is a member of this body and has no membership in any local body.

SEC. 4. This Association will receive no delegates who, since August 1875, shall have entered the profession without having first graduated at some reputable dental or medical college.

ARTICLE V.

SIGNING CONSTITUTION.

SECTION 1. Each new member, before voting or speaking on any subject before the meeting, shall sign this Constitution, inscribing his name and the title of the society from which he receives his appointment. It is expressly agreed by each member in signing this Constitution that he will accept the discipline of a two-thirds vote of this Association.

DUES.

SEC 2. The annual dues in this Association shall be five dollars.

DUES TO BE PAID.

SEC. 3. No member is eligible to office, nor can he speak or vote in this Association, in any of its sections, or in any of its branches, until his annual dues are paid.

DUES—IF UNPAID.

SEC. 4. If the dues of any member remain unpaid for two years his name shall be erased from the list of members of this Association.

CONDUCT OF MEMBERS.

SEC. 5. Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive Committee, whose duty it shall be to thoroughly examine into the case, and if the charges be sustained, to report to the Executive Council during the annual session at which the charges are preferred. Whereupon by a vote of the Council the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

EXPELLED MEMBERS.

SEC 6. Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body.

RESIGNATION OF MEMBERS.

SEC. 7. Any member not in arrears may offer his resignation, upon the acceptance of which by the Council his membership shall cease; but the Council may at any time thereafter reinstate such member by unanimous consent. In case a member is dropped for non-payment of dues, two years' dues must be paid before reinstatement; nor shall he represent his society as a delegate until the two years' back dues are paid.

ARTICLE VI.

OFFICERS.

SECTION 1. The officers of this Association shall be a President, three Vice-presidents, Corresponding Secretary, Recording Secretary, Treasurer, an Executive Committee consisting of nine members, an Executive Council consisting of the President, Secretary, and five members, three Chairmen and three Secretaries of Sections, to be elected as hereinafter provided.

SEC 2. Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected and qualified to succeed him.

SEC 3. The President shall be chosen from the division in which the next anual session is to be held, and one of the Vice-presidents shall be chosen from each division. (See Article XII.)

SEC 4. At the first election three members of the Executive Committee shall be elected from each division of the country, who shall hold office for one, two, and three years, respectively; afterward but one mem-

ber shall be elected each year from each division, and hold office for three years.

SEC. 5. One member of the Council shall be elected each year from the division in which the newly elected President resides, and two members from each of the others.

SEC. 6. At the first election after this amendment goes into effect, one Chairman and one senior and one junior Past Chairman for each section shall be elected. Thereafter one Chairman and one Secretary of Sections shall be elected each year from each division, and each Chairman of Sections shall be known as Junior Past Chairman for the first year and as Senior Past Chairman for the second year after the expiration of his time as Chairman.

SEC. 7. The names of places for holding the next annual session and the candidates for office shall be nominated by informal ballot of the Association. The three names that are highest, or in case of tie, four names having the greatest number of votes, shall be the sole nominees. A formal ballot shall then be taken in which a majority of the ballots cast shall be necessary to a choice. If a choice be not made on the second formal ballot the name of the candidate receiving the fewest votes shall be dropped on the third formal ballot. The informal ballot may be made a formal ballot by a three-fourths vote of the Association. Provided that for the re-election of Recording Secretary, Corresponding Secretary, Treasurer, and Secretaries of Sections a motion, seconded, that the Recording Secretary, or Treasurer, shall cast the ballot, shall be entertained, but if this fails to carry, nominations shall be made as hereinbefore specified.

ARTICLE VII—DUTIES OF OFFICERS.

DUTIES OF PRESIDENT.

SECTION 1. The President shall preside according to parliamentary usage as laid down in "Roberts' Rules of Order" and the Rules of Order adopted by this Association, and shall present an annual address.

DUTIES OF VICE-PRESIDENT.

SEC. 2. In the absence of the President, one of the Vice-presidents shall perform the duties of the office, and in absence of these officers a Chairman *pro tem.* shall be appointed by the Executive Council.

DUTIES OF CORRESPONDING SECRETARY.

SEC. 3. The Corresponding Secretary shall attend to the correspondence of the Association with other scientific bodies, when desirable, and with the societies represented in this Association. It shall be his duty to obtain information of and report annually to the Executive Council, and with its approval to this Association, an account of the meetings held, the numbers of the membership and attendance, subjects discussed in papers, essays, or otherwise, by the societies represented in this Association, and such other matters of interest as it may be well to incorporate in the proceedings of this body.

DUTIES OF RECORDING SECRETARY.

SEC. 4. The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be *ex officio* Chairman of the Publication Committee, and shall see that due notice is given of the time and place of the annual sessions of the Association. He shall be secretary of the Program Committee, and see to the preparation and printing for this committee and its distribution to the members of all societies represented in this Association, and shall provide each newly elected official with a correct copy of this Constitution.

DUTIES OF TREASURER.

SEC. 5. The Treasurer shall hold all the moneys belonging to the Association and shall keep an accurate account as between the Association and its members. He shall furnish bonds satisfactory to the Executive Committee. He shall attend the session of the Executive Committee at 9 A.M. on the first day of the annual session to receive dues, and shall attend at roll call to verify the lists of names upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall pay the drafts of the Secretary, countersigned by the President, and shall report to the Executive Committee, where his accounts shall be audited and by

whom his report shall be presented to the Executive Council, together with their own.

SEC. 6. All resolutions appropriating money, except for the legitimate expense of this Association, shall require a two-thirds vote of all the members of the Association present at a general session of an annual session.

ARTICLE VIII.

EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall be the business committee *ad interim* of the Association. They shall report to the Executive Council at each annual session, under the proper head, their doings for the current year.

SUBDIVISION OF THE EXECUTIVE COMMITTEE.

SEC. 2. The Executive Committee shall meet after the election of new members to choose their own chairman and secretary, and to divide themselves into three sub-committees as follows, and for the purpose described:

FIRST DIVISION OF THE EXECUTIVE COMMITTEE.

SEC. 3. The first division of the Executive Committee shall include its chairman. It shall act as the Committee of Arrangements, and shall make suitable preparations for the meetings of the Association, consulting with the Program Committee as to its needs. It shall report to the Executive Council at its first meeting of the annual session and with its approval see to the carrying out of the arrangements during the annual session. It shall provide a book for the registration of members or visitors as they arrive; and it shall be their further duty to secure from the Treasurer a good and sufficient bond.

SECOND DIVISION—CREDENTIALS AND AUDITING COMMITTEE.

SEC. 4. The second division of the Executive Committee shall act as a committee on registration, and shall meet for that purpose at 8 A.M. on the first day of the annual session. They shall examine and verify the qualifications of members, including all violations of the Code of Ethics and the Constitution. They shall register the names of members or visitors as they arrive, with place of their residence and hotel address, and give them all necessary information regarding the arrangements for the meetings, the literary program and arrangements for entertainment, if any. They shall also act as the auditing committee for the year.

THIRD DIVISION—COMMITTEE ON VOLUNTEER ESSAYS.

SEC. 5. It shall be the duty of the third division to examine all essays, papers, or reports that may be referred to it by the Executive Council before presentation to the Association, and to report to the Executive Council their approval or disapproval of such essays, papers, or reports in whole or in any particular parts, to the end that the time of the Association may not be occupied by the reading of irrevelant, unimportant, or improper matter.

REPORTS OF SUB-COMMITTEES.

SEC. 6. Each of these Sub-committees shall report from time to time, as may be necessary, to the Executive Committee as a whole, who shall decide upon such report, if possible; but in case of their inability to decide upon any matter, it shall be brought before the Executive Council for its decision.

MEETINGS OF EXECUTIVE COMMITTEE.

SEC. 7. The Executive Committee shall, if possible, meet for consultation and arrangement of their respective duties on the day preceding the annual session of the Association. The Chairman may at his discretion summon the members thereof to a meeting for consultation or making reports, at any suitable hour during the annual session of the Association, and at any other time at the request of five members of the committee.

ARTICLE IX.

EXECUTIVE COUNCIL.

SECTION 1. The Executive Council shall be the business head of the Association during its annual session, and when it deems it necessary have charge of all its business matters whatsoever, and it will be its duty to take cognizance of the doings of any and all of its officers, see to the smooth working of all of its parts, and attend to all matters referred to it.

SEC. 2. The Executive Council shall meet at nine o'clock on the day of the first meeting of each annual session to receive reports of committees, and afterward by adjournment or at the call of the presiding officers and committees, for the transaction of other business of the Association.

SEC. 3. All matters not otherwise specially provided for shall be referred to the Executive Council without debate.

SEC. 4. The Executive Council shall report to the Association at each general session the results of their proceedings for ratification or rejection without debate.

SEC. 5. The President and Secretary of this Association shall hold the same positions in the Executive Council as in the Association.

SEC. 6. Five members of the Council shall constitute a quorum for the transaction of business.

SEC. 7. All meetings of the Council shall be public; the time and place for which shall be posted for information of the members. Members may be heard on any matter before the Council.

ARTICLE X.

LOCAL COMMITTEE OF ARRANGEMENTS.

SECTION 1. There shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to assist the Executive Committee to procure rooms for meetings, and make such other local arrangements as may be needed for the Association.

VACANCIES.

SEC. 2. In case vacancies occur in the Committees or Officers of this Association by reason of absence from the annual session or otherwise, such vacancies shall be filled by appointment *pro tem.* by the President.

PUBLICATION COMMITTEE—HOW APPOINTED.

SEC. 3. The President shall appoint two members of this Association who shall act in conjunction with the Recording Secretary as the Publication Committee. The Committee shall be authorized to employ a sufficient number of competent reporters to furnish an accurate report of the proceedings of each meeting of sections and of each general session.

ARTICLE XI.

INSTRUCTIONS TO THE PUBLICATION COMMITTEE.

SECTION 1. The Publication Committee shall superintend the publication and distribution of such portions of the transactions as the Executive Council may direct, or the Committee judge to be of sufficient value.

They shall specify in the annual report of this Committee the character and cost of the publications of the Association during the year, to whom they are distributed, and the number of copies still on hand.

SEC. 2. Any report or other paper to be entitled to publication in the volume of Transactions for the year in which it shall be presented to the Association, must be placed in the hands of the Publication Committee in typewritten form within twenty days after the close of the annual session; and must also be so prepared that the proof-sheets furnished the authors shall be returned to the Committee without material alteration or addition.

SEC. 3. Every paper received and accepted by this Association, and all plates or other means of illustration shall be considered the property of the Association, so far as may be necessary for publication in the Transactions of this body.

DISCLAIMER.

SEC. 4. The Publication Committee is hereby instructed to print at the beginning of each volume of the Transactions the following disclaimer, viz: "The National Dental Association, although formally accepting and publishing the reports of the various sections, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

ARTICLE XII.

SECTION 1. For the purpose of this Association, the United States shall be divided into three divisions, to be called the East, the South, and the West.

The East shall include New England, New York, New Jersey, Pennsylvania, Ohio, In-

diana, lower peninsula of Michigan, and Ontario.

The South shall include Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, West Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Kentucky, Tennessee, Arkansas, Oklahoma, and Indian Territory.

The West shall include Illinois, Missouri, Wisconsin, upper peninsula of Michigan, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Idaho, Utah, Washington, Oregon, Nevada, California, Arizona, New Mexico, and Alaska.

PLACE OF MEETING.

SEC. 2. The place of holding the next annual session shall be determined each year by ballot of the Association at its annual session, in the general session of the third day, except that the place of meeting shall be in the West in 1898, in the East in 1899, and in the South in 1900, and thereafter, in the order named, meeting in each section every third year.

ARTICLE XIII.

ORGANIZATION OF SECTIONS.

SECTION 1. This Association shall be divided into three sections as follows:

The first section shall have charge of prosthetic dentistry, crown and bridge work, orthodontia, metallurgy, chemistry, and allied subjects.

The second section shall have charge of operative dentistry, nomenclature, literature, dental education, and allied subjects.

The third section shall have charge of oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

SEC. 2. It shall be the duty of each member to identify himself with one or more of the above-named sections, and he shall inform the Recording Secretary of his choice at the time of joining the Association.

SEC. 3. The Secretary shall assign members to the sections in which they are expected to work if they shall fail to make their own choice before the close of the general session of the second day of the annual session.

SEC. 4. It shall be the duty of the Recording Secretary to keep a list of the members of the sections and to furnish copies of the same to the officers of the sections.

SEC. 5. The Chairman of each section shall preside at all of its meetings; shall exercise general supervision over its business, and shall see that the labors of his section are so conducted as to secure the best results. In the absence of the Chairman the senior or junior past Chairman shall preside. (See Article VI, Section 6.)

SEC. 6. The Secretary of each section shall keep full and accurate records of the doings of his section, shall have charge of the stenographic reports, and report the same to the Recording Secretary each day, as soon as possible after their approval by his section.

SEC. 7. For information of all members a list of the names of members of sections shall be published in the Transactions of each year.

ARTICLE XIV.

MEETINGS.

SECTION 1. The meetings of this Association shall be known as annual sessions, general sessions, and meetings of sections.

SEC. 2. The annual sessions shall begin on the first Tuesday in August of each year and continue four days.

SEC. 3. The general sessions shall be meetings of the whole membership in attendance upon the annual session, and shall be held as follows:

The first general session shall convene at 10 o'clock on the first day and shall stand adjourned at 1 P.M., unless adjourned earlier. During this session the functions appropriate to the opening of the annual session may be performed, and the annual address of the President delivered.

On the second, third, and fourth days the Association shall convene in general session at 12 o'clock, noon, and stand adjourned at thirty minutes past one, unless adjourned sooner.

SEC. 4. In the general sessions any member may introduce matters of business, if seconded, which must then be referred to the Executive Council without debate; provided, that any member opposed to such matter of business or motion, with a second, may call for a vote on such reference. A vote shall then be taken without debate, and if

decided in the negative, that shall dispose of the matter for that annual session.

SEC. 5. The general session shall receive reports from the Executive Council as the first order of business after the reading of the minutes, and shall approve or annul any matter of business or motions referred to it by the Executive Council by vote without debate.

SEC. 6. The election of officers of the Association shall be held at the general session of the third day of the annual session, and newly elected officers presiding over the general sessions shall be installed at the close of the general sessions on the fourth day, and those presiding over meetings of each section, at the close of the last meeting of the section during the annual session.

SEC. 7. At the second and fourth general session there may be presented such addresses or reports as may be determined by the Program Committee, with the approval of the Executive Council, but these shall in no case occupy more than one hour of the general session.

SEC. 8. Sections I, II, and III shall each meet in separate rooms at 2.30 o'clock on the first day of the annual session, for the reading and discussion of such essays, papers, reports, or for clinics, as may be determined upon by the Program Committee, with the approval of the Executive Council. Thereafter similar meetings of each section shall be held at 9 A.M. and 2.30 P.M. each day of the annual session. Evening meetings of the sections may be held as determined by each section.

SEC. 9. No business of any kind not strictly pertaining to the proper carrying out of the literary, scientific, or clinical work of the sections shall be introduced or considered in the meetings of the sections.

ARTICLE XV.

PROGRAM COMMITTEE.

SECTION. 1. The Committee on Program shall consist of the President, Secretary, the Chairmen of sections and the two last past Chairmen of sections. It shall be the duty of this Program Committee to keep close watch over the progress of dental science and literature, and to arrange with competent persons in the profession who are members of this Association, or with persons of known ability in closely allied subjects in science not members, to prepare and read or to discuss essays, papers, contributions, or perform such clinical demonstrations as will tend to the improvement of dentistry. It shall report to the Chairman of the Executive Committee what special preparations may be needed for carrying out the program that may be arranged or contemplated.

SEC. 2. The senior past Chairman, junior past Chairman, and Chairman of each section shall, subject to the Committee, act as a Subcommittee having especial charge of the program of that section, the responsibility in this work being in the order named.

SEC. 3. The President of the Association shall be President of the Program Committee, or, when present, shall preside over meetings of a Sub-committee. The preparation of the program for the general sessions shall be under his charge. In meetings of the Program Committee, in the absence of the President, the senior past Chairman of sections present shall preside, seniority beginning with the division in which the President resides and following the order of rotation.

SEC. 4. The Recording Secretary shall act as the Secretary of the Program Committee and shall have charge of the preparation, printing, and distribution of the programs. He shall announce at each general session the arrangement of the program for the next general session; and also the program for each of the sections for the next twenty-four hours.

SEC. 5. The Program Committee shall meet for consultation regarding the next year's work as soon as possible after the election of officers, and hold such meetings thereafter on the call of the President or Secretary, as may be deemed necessary to the efficient carrying out of the work.

SEC. 6. The Program Committee shall report to the Executive Council at its first meeting on the morning of the first day of the annual session the program arranged, for approval, and thereafter shall hold such meetings as may be necessary to arrange from day to day for the smooth working of the presentation and discussion of the matter of the program in the general sessions and meetings of sections.

ARTICLE XVI.

QUORUM.

Twenty members shall constitute a quorum in this Association.

ARTICLE XVII.

SUSPENSION OF RULES—THREE-FOURTHS TO VOTE.

The regular order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

ARTICLE XVIII.

BRANCHES.

SECTION 1. For the wider diffusion of the benefits of this Association, the members of each division may form themselves into one or more separate bodies, to be styled "Branches."

POWERS AND OBLIGATIONS.

SEC. 2. Branches shall have such powers and privileges, and be subject to such obligations, as shall be determined upon from time to time by the National Association in annual session.

SEC. 3. Each Branch shall be free to hold meetings and to govern itself as its members shall think fit, but no Branch law shall be valid which in the opinion of the National Association may contravene any fundamental law of the Association.

SEC. 4. Each Branch shall pay its own expenses, and no Branch shall be deemed for any purpose the agent of the Association, or have power to incur any obligation in its behalf.

SEC. 5. Each Branch shall furnish a copy of its proceedings, including papers and discussions, for publication with the Transactions of the National Association.

SEC. 6. Each Branch may receive delegates from societies within its division upon the same conditions as the National Association, and such delegates shall have the same standing in the National Association as though admitted directly from state societies.

DUES.

SEC. 7. The annual dues of members attending the Branches shall be paid to the Branch Treasurer. Three-fifths of the dues may be retained for the benefit of the Branch. The remaining two-fifths shall be paid over to the Treasurer of the National Association.

SEC. 8. The annual session of any Branch shall be omitted whenever the annual session of the National Association shall be held in its division.

ORDER OF BUSINESS.

FIRST DAY.

8 A.M.—Meeting of the Executive Committee.
8 A.M.—Meeting of the Program Committee.
9 A.M.—Meeting of the Executive Council.
10 A.M.—Meeting in general session.
Report of Executive Council.
Report on Program for next general session, and for each section for next 24 hours.
President's Address.
1 P.M.—Adjournment of general session, unless sooner adjourned.
2.30 P.M.—Meetings of sections for literary and scientific work.
8 P.M.—Meetings of sections for literary and scientific work.

SECOND DAY.

9 A.M.—Meetings of sections for literary and scientific work.
12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Report on Program.
Address, or Reports.
2.30 P.M.—Meetings of sections for literary and scientific work.
8 P.M.—Meetings of sections for literary and scientific work.

THIRD DAY.

9 A.M.—Meetings of sections for literary and scientific work.
12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Report on Program.
Selection of next place of meeting.
Election of Officers.
1.30 P.M.—Adjournment, if not adjourned earlier.
2.30 P.M.—Meetings of sections for literary and scientific work.
8 P.M.—Meetings of sections for literary and scientific work.

FOURTH DAY.

9 A.M.—Meetings of sections for literary and scientific work.
12 NOON—Meeting in general session.
Reading of Minutes.
Report of Executive Council.
Address, or Reports.
Installation of Officers.
Appointment of Committees.
Final Reading of Minutes.
Adjournment of the Annual Session.

AMENDMENTS.

The Constitution, Rules of Order and Order of Business of this Association may be altered or amended at any annual session by unanimous consent of the members present providing notice has been given in writing at a previous meeting of the annual session at which the amendment is proposed; or by a vote of two-thirds of the members present, providing notice of the alteration or amendment has been given in writing at a previous annual session.

STANDING RESOLUTIONS.

THE following standing resolutions are in force at this time:

1. RESOLVED, That a paper presented to the Committee on Voluntary Essays, and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

2. RESOLVED, That this Association discountenances the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

3. RESOLVED, That it is unprofessional to use on cards or signs anything except name, title, and address.

4. RESOLVED, That this Association directs that sections belonging thereto shall be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

5. RESOLVED, That a standing committee of three be appointed, to be known as the Committee on Terminology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

6. RESOLVED, That this Association believes the conferring of honorary degrees in dentistry to be detrimental to the profession of dentistry, and hereby expresses its disapprobation of the practice.

7. RESOLVED, That a committee of three be appointed by the chair to co-operate with the officers in charge of the Army Medical Museum and Library in enriching its store of dental literature and specimens, especially by appealing to dental societies and individual members of the dental profession for assistance.

8. RESOLVED, That the National Dental Association condems the use of secret preparations known as "*local anesthetics*," as well as all other secret preparations.

9. RESOLVED, That the secretary or other officer of each society sending delegates to this Association is expected to make a general report of the work done by the society he repsents during the year, giving the subjects of the papers read before them and digests of the same, and to send said reports to the Secretary of this Association at least three weeks before the date of each annual meeting; the reports to be forwarded to the chairman of the section to which they belong.

10. RESOLVED, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in the Association without payment of dues, and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

11. RESOLVED, That lists of the ex-presidents of the American Dental Association and of the Southern Dental Association shall be published annually in the Transactions of the National Dental Association, and that all members and officers hold the same relations to the National Dental Association that they did to the former associations.

RULES OF ORDER.

1. On the arrival of the hour of meeting, the President shall take the chair, call to order, and announce that the meeting is open for business.

2. No motion or speech shall be in order until the mover or speaker shall have been recognized and assigned the floor by the chair, nor shall a motion be open for debate until seconded and stated by the chair.

3. No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

4. At the request of any member a motion shall be put in writing.

5. At the request of five members a question shall be divided or the yeas and nays ordered.

6. When a question is under debate no other motion shall be in order, except—1st, to adjourn; 2d, to lay on the table; 3d, the previous question; 4th, to postpone; 5th, to commit; 6th, to amend—and these motions shall take precedence in the order here stated.

7. The previous question and the motions to adjourn, to lay on the table, and to postpone, shall be decided without debate.

8. A motion to adjourn shall always be in order, but no member can make such a motion while another is speaking or while a vote or ballot is being taken.

9. A second amendment to the main question shall not be in order until the first is disposed of, nor shall there be an amendment of an amendment to an amendment.

10. After a motion has been seconded and stated by the chair, it shall not be withdrawn without the consent of the Association.

11. No member shall interrupt another while speaking, except to raise a point of order.

12. When called to order, a member shall sit down until the point of order is decided by the chair, or in case of appeal, by the Association. If the point of order be sustained, the member can proceed in order by the consent of the Association.

13. Every member shall vote upon a question unless excused by the Association.

14. When any motion, except to adjourn, has been rejected, it shall not be renewed without unanimous consent.

15. Any member who on a question voted in the majority may move a reconsideration of that question; but if that motion shall be lost or laid upon the table, it shall not be renewed without unanimous consent.

16. The President may vote with the members upon all questions, but having so voted, shall not give the casting vote in case of a tie.

17. Motions for filling blanks shall be put in the order in which they are moved.

18. On a division, or in voting by yeas and nays, any member may change his vote before the result is declared.

19. These rules may be suspended by unanimous consent.

Code of Ethics.

ARTICLE I.

THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

SECTION 1. The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are in most cases unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients, and even the simplest case committed to his care should receive that attention which is due to operations performed on living, sensitive tissue.

SEC. 2. It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist should make due allowance for this, patiently explaining many things which may seem quite clear to himself, thus endeavoring to educate the public mind so that it will properly appreciate the beneficent efforts of our profession. He should encourage no false hopes by promising success when, in the nature of the case, there is uncertainty.

SEC. 3. The dentist should be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which is their right.

ARTICLE II.

MAINTAINING PROFESSIONAL CHARACTER.

SECTION 1. A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to dishonor his profession, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged, special encouragement to their juniors.

SEC. 2. It is unprofessional to resort to public advertisement, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, special modes of operating; or to claim superiority over neighboring practitioners; to publish reports of cases or certificates in the public prints, to circulate or recommend nostrums; or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by cards, simply their names, occupation, and place of business, or in the same manner to announce their removal, absence from, or return to business, or to issue to their patients appointment cards, having a fee bill for professional services thereon.

SEC. 3. When consulted by the patient of another practitioner the dentist should guard against inquiries or hints disparaging to the family dentist or calculated to weaken the patient's confidence in him; and if the interest of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 4. When general rules shall have been adopted by members of the profession practicing in the same localities in relation to fees, it is unprofessional and dishonorable to depart from those rules, except when variation of circumstances requires it. And it is ever to be regarded as unprofessional to warrant operations as an inducement to patronage.

ARTICLE III.

CONSULTATIONS.

Consultations should be promoted in difficult or protracted cases, as they give rise to

confidence, energy, and broader views in practice. In consultations that courtesy and just dealing which is the right of all should be especially observed.

ARTICLE IV.

THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and adjacent parts. With these he should be more familiar than the general practitioner is expected to be; and while he recognizes the broader knowledge of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty.

ARTICLE V.

THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and at the same time the best judges, of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and many other benefits conferred by the competent and honorable dentist, the profession is entitled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity against the empiric and impostor. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way, without proper remuneration.

SOUTHERN BRANCH.

FOURTEENTH ANNUAL MEETING.

TRANSACTIONS

OF THE

SOUTHERN BRANCH

OF THE

National Dental Association

AT THE

FOURTEENTH ANNUAL MEETING

Atlanta, Ga., April 4, 5, and 6, 1911.

OFFICERS.

President—S. W. Foster, Atlanta, Ga.
First Vice-president—W. H. Scherer, Houston, Texas.
Second Vice-president—R. B. Bogle, Nashville, Tenn.
Third Vice-president—C. M. Barnwell, Atlanta, Ga.
Recording Secretary—W. A. Dean, Tampa, Fla.
Corresponding Secretary—T. T. Moore, Jr., Columbia, S. C.
Treasurer—B. D. Brabson, Knoxville, Tenn.

EXECUTIVE COMMITTEE.

V. E. Turner, *Chairman,* Raleigh, N. C.
B. Holly Smith, Baltimore, Md.
R. W. Carroll, Beaumont, Texas.
H. C. Hassell, Tuscaloosa, Ala.
A. J. Cottrell, Knoxville, Tenn.
C. L. Alexander, Charlotte, N. C.

CONTENTS.

SOUTHERN BRANCH—ATLANTA, GA., 1911.

FIRST DAY.

PAGE

Morning Session 445

Address of welcome (from the state of Georgia), delivered by Hon. JOSEPH M. BROWN 445

Address of welcome (from the city of Atlanta), delivered by Hon. STEVE JOHNSTON 446

Address of welcome (from the dentists of Atlanta), delivered by Dr. DE-LOS HILL 447

Response to the addresses of welcome. By Dr. M. F. FINLEY 448

President's Address—Annual Address of the President. By Dr. H. CLAY HASSELL 450

Afternoon Session 454

Paper—"Microscopical Introspection: A Review of the Present Status of Dental Education." By Dr. WM. A. LOVETT 455

Discussion 467

Paper—"The Dental Educational Standard." By Dr. D. D. ATKINSON 464

Discussion 467

Evening Session 479

Paper—"Developmental Pathology: A Study in Degenerative Evolution." By Dr. EUGENE S. TALBOT 479

Discussion 483

SECOND DAY

PAGE

Morning Session 488

Motion carried that in future the annual banquet be given on the subscription plan, without expense to the society 488

Paper—"Some Suggestions to Those Who Lecture to the Public on Oral Hygiene." By Dr. R. C. YOUNG 488

Discussion 491

Remarks by Dr. WM. CRENSHAW, Chairman of the N. D. A. Committee on Legislation, on the present status of army dental legislation .. 497

Resolutions adopted expressing appreciation of Senator Lee S. Overman's efficient services in regard to oral hygiene in the army 497

Paper—"Some Phases of Dental Chemistry." By Dr. N. A. TEAGUE 499

Discussion 505

Evening Session—PUBLIC ORAL HYGIENE MEETING 508

Remarks by Dr. J. W. DOWD 508

Paper—"The Establishing of a Free Dental Dispensary." By Dr. WM. W. BELCHER 512

Remarks by Dr. W. A. WHITE, on the establishment of the oral hygiene department of the New York State Board of Health 518

THIRD DAY.

Morning Session 522

Paper—"The Reorganization of the National Dental Association." By Dr. H. C. BROWN 522

Discussion 527

Southern Branch Committee on Revision of By-Laws appointed as delegates to the conference in Cleveland for revision of the constitution and by-laws of the N. D. A. 531

Report of Committee on President's Address 531

Resolution adopted providing that no one but members of the association may contribute to the program 532

Paper—"The Care of the Mouths and Teeth of Little Children." By Dr. H. B. TILESTON 533

Discussion 539

PAGE

Paper—"Surgery of the Pulp, and Its Relation to Periapical Infection." By Dr. N. S. LEONARD 541
Discussion 547
Paper—"Cast Gold Inlays." By Dr. THOS. P. HINMAN 548
Discussion 551
Paper—"The Adolescence of the Dental Profession." By Dr. J. P. CORLEY 553
Discussion 556

Afternoon Session 556
Report of Committee on Necrology 556
Resolution adopted providing that the Southern Branch set aside one dollar of the dues of each member (beginning in 1912) toward the Journal fund of the N. D. A. 557
Paper—"Pathologic Conditions of the Mouth and Jaws." By Dr. G. V. I. BROWN 557
Discussion 560
Paper—"The Day of the Operative Dentist At Hand." By Dr. E. P. BEADLES 563
Report of Committee on Appliances and Improvements. By Dr. W. H. SCHERER 565
Report of Committee on Oral Hygiene 574
Report of Committee on Operative Dentistry 574
Resolutions adopted extending thanks to the city of Atlanta, to the Piedmont Hotel management, and to the newspapers of the city 575
Report of the Treasurer 575
Election of Officers 575
Adjournment 576

FOURTEENTH ANNUAL MEETING

OF THE

National Dental Association—Southern Branch,

HELD AT

ATLANTA, GA., APRIL 4, 5, and 6, 1911.

FIRST DAY—Tuesday, April 4th.

THE fourteenth annual meeting of the Southern Branch of the National Dental Association was called to order in the assembly room of the Piedmont Hotel, Atlanta, Ga., April 4, 1911, at 10 A.M., by the president, Dr. H. C. Hassell, Tuscaloosa, Ala.

Rev. C. T. A. PISE, Atlanta, invoked the divine blessing upon the deliberations of the association.

Welcome from the State of Georgia.

Mr. F. O. Foster, Atlanta, introduced to the audience Hon. JOSEPH M. BROWN, governor of Georgia, who welcomed the association on behalf of the state of Georgia, as follows:

Mr. President, ladies and gentlemen of the National Dental Association,—In looking over the morning paper, which gives your program in abstract, my eye was attracted by one little sentence which commended itself to my appreciation. It was this: "All the speeches will be limited to five minutes." I think that is peculiarly appropriate for a speech of welcome to the delegates of a convention. Those speeches which mean most to the members of the profession should occupy the time and receive the major thought.

I am here to extend to you in the name of the state of Georgia her high and cordial feeling of welcome, and to express our appreciation of your having chosen this state and this city as your meeting-place. We can tender to you the hospitalities of a people to whom hospitality is a real pleasure. We can face you with the assurance that from whatever state you may come, you will find a welcome in the state of Georgia. She is a member of the American sister-

hood of states, and she accords to each the same feeling of co-operative endeavor.

I was reflecting before coming here this morning on the fact that there is one trouble which is not limited to age, sex, climate, or nationality—that is, toothache. The Eskimo has it; the dweller at the equator has it; it is felt among the peoples of every continent; there is no militia district in this state or any other where people do not have trouble with their teeth, and you who have made it your profession to alleviate these pains can justly be hailed as benefactors of mankind.

I was reading some time ago a book on Egyptian antiquities, and was quite surprised to find that in the teeth of one of the mummies gold fillings were found. I was also struck some years ago, in reading a book on Peruvian antiquities, that there were evidences of the filling of teeth among the Incas. This all goes to show that there is nothing new under the sun, and yet, when you consider the old way of pulling teeth by main force, obliging the patient to endure it as best he could, and consider that now the application of cocain and other anesthetics makes us oblivious to pain, we must admit that at least a new process is being used for the alleviation of the troubles of mankind.

As to your meeting, I will say but a few words. There is a value in the assembling of men and women in any branch of business which may claim human co-operation and endeavor; there is something in the meeting face-to-face, in the confidence you acquire in one another; there is something in the tone of voice in which you speak; something which enables you, after you become acquainted, to receive a letter and read between the lines in a way that you would not before have had the power to do. But there is another something, and that is the interchanging of views, the clashing of intellect against intellect, as my old college professor at Harvard said, which brings about progress in every profession. By the mutual interchange of thought and of information you acquire additional knowledge, and that knowledge, I feel sure, you will continue to use for the benefit of mankind.

Ladies and gentlemen, in the name of the state of Georgia and her citizens, I again extend to you a heartfelt welcome to our midst and co-ordinately to our hearts. [Applause.]

Welcome from the City of Atlanta.

Mr. Foster next introduced Hon. STEVE JOHNSTON, mayor *pro tem.* of the city of Atlanta, who welcomed the association on behalf of the city of Atlanta, as follows:

Mr. President, ladies and gentlemen, —I regret most sincerely that his Honor Mayor Winn is not present this morning.

I am glad to represent the mayor on this occasion and to welcome you, gentlemen, to the best town in the best state on earth. The latch-strings of the homes of two hundred and fifty thousand people are on the outside, and you do not have to pull them to receive a cordial welcome to the hearts and homes of every citizen in Atlanta.

Personally I like dentists very much; among them are some of my warmest and closest friends, but in a business way, or in an official way, I have no use for them. There never was a bigger coward on earth, so far as dentistry is concerned, than I am. I was reading one of the mottoes on the wall a few moments

ago which says, "God made us; Filth decayed us; The dentist slayed us," and from my own personal experience, I think there is a great deal of truth in that.

We of the Sunny South are glad to have you with us in this geographical center of the South. We hope that your stay with us will be a pleasant one. If you see anything you want, take it—and if you get into trouble, call on me.

I extend to you on behalf of Mayor Winn a truly heartfelt welcome to our great city, and hope that you may take home with you the pleasant remembrance of a delightful time. [Applause.]

Welcome from the Dentists of Atlanta.

The next speaker introduced was Dr. DeLos Hill, who welcomed the association to the city on behalf of the dentists of Atlanta, as follows:

Mr. President, ladies and gentlemen of the Southern Branch of the National Dental Association,—As the official representative of the Atlanta Society of Dental Surgery, I have the honor and the pleasure of welcoming you to our city, and to extend to you the right hand of fellowship, and with it impart to you the grip of true friendship and fraternal feeling.

We extend to you a welcome as professional gentlemen engaged in a calling which, if you carry out its philanthropy to the full conception thereof, renders greater service to suffering humanity than any other profession on earth, barring none.

The physician has long thought that he was accomplishing more than any other man engaged in any of the healing arts, and due credit must be given him for his many wonderful works and the advancement he has made, but he does not relieve as much actual suffering, he does not come in contact with as many different conditions, and he does not do as much in the way of hygiene for the general welfare of the people as the dental practitioner.

It is said that the physician buries half his work, while your own work either stands as a monument to your skill and faithful endeavor, or stares you in the face as a veritable Banquo's ghost that will not down.

Comparatively few realize the value of the work of this association, and I wish that every eligible dentist in the Southern states were present to participate in the deliberations of this body. It is your duty, gentlemen, to carry forward the banner of dental surgery in the South, and plant it well upon the ramparts of scientific knowledge. There is a wonderful work for each and every one of us who exercises an influence toward the development of our calling, and no one can perform his whole duty to himself, his profession, or his *clientèle* if he ignores the benefits to be derived from association work.

A distinguished writer once said: "When I lie down, others will pass by, young and fresh. On the steps I have cut, they will climb; on the stairs I have built, they will mount. They may laugh at the clumsy work, but they will climb up my stairs and through me they will find truth."

On behalf of the Atlanta Society of Dental Surgery, I welcome you to our offices, our clubs, our homes, and our hearts. Ask for anything you wish, and it will be forthcoming with true Southern hospitality. [Applause.]

Response to Addresses of Welcome.

Dr. M. F. FINLEY, Washington, D. C., responded to the addresses of welcome as follows:

Your Excellency Governor Brown, your Honor Mayor pro tem. Johnston, Dr. Hill, Mr. President, ladies and gentlemen,—By this goodly attendance of dental practitioners from many sections of this great Union of states, you must be assured that we, who are visitors, realized how gracious and hearty would be the welcome extended by those who should speak for this state, for this city, and for the profession. Even so, we are more impressed than we anticipated by the warm greeting on every hand, and the cordiality which is so manifest—true Southern hospitality. It is indeed a pleasure and a privilege to say for all assembled how much we appreciate these kind words of welcome, and to thank you most sincerely for the personal cordiality accompanying each greeting.

We are aware of your facilities for and zeal in promoting the high ideals which are being advocated in all dental society meetings, and are sure that on this occasion a record will be made of which we may be proud. We are mindful of the consideration Governor Brown has shown us by coming personally and, as it were, setting an example in offering the goodwill of all the people in the state to this convention, which is to consider problems which involve the interests of the people in giving them the best service possible, broadening the sphere of usefulness, reaching out as near as may be to the goal of perfection in the many-sided duties which a dental practitioner is called upon to perform, and of which, in his preparation for this practice, he is constantly reminded in his college course.

Frequently the statement has been made in our conventions that individuals have given up dentistry in favor of some other specialty of medicine because the latter was less exacting and did not require so much all-round training as did dentistry; yet we are brave enough to face these difficulties, and to keep at our task of uplifting our profession to the point of recognition by the government and the people and all other professions in its rightful claim as a learned and philanthropic one. Let me enumerate a few results successfully accomplished in the name of the National Dental Association within the last twelve months. In 1906, in this city, as presiding officer of the National Dental Association, I suggested that we should seek membership in the United States Pharmacopeial Convention. A reply was at that time read from Dr. Joseph P. Remington, chairman of the Committee of Revision, writing for Dr. H. C. Wood, the president of that body, in reply to my inquiry regarding the necessary procedure to accomplish such a result, and happily, at the decennial assembly of the United States Pharmacopeial Convention, held in May 1910 in Washington, D. C., delegates representing the National Dental Association were admitted to full membership. Upon realizing that, because of the multiplicity of dental mouth preparations on the market, we as practitioners were not able to determine their purity and integrity by self-made tests, so that we could answer questions pertaining thereto with perfect authority, we were fortunately made aware that the bureau of chemistry of the United States Department of Agriculture would make these tests upon a request emanating from the National Dental Association, in like manner as they were making exami-

nations of drugs and proprietary preparations upon the request of the Council of the American Medical Association.

The District of Columbia Dental Society nearly two years ago drew up the resolution which was later adopted by the National Dental Association at Denver and presented to the Secretary of Agriculture, who graciously accepted the call for assistance, and I have in my possession a letter from the acting Secretary of Agriculture that not only will these examinations be made, but the results will be published in bulletin form for our information and guidance.

Undoubtedly, the greatest step of all in real recognition of our profession, in its far-reaching effect, is the culmination of twelve years of effort with Congress and the War department in securing commissioned rank, with provision for retirement, for the army dental corps in the closing days of the sixty-first Congress. There has been much misguided opposition in the ranks of our own profession, even admittedly personal spite and revenge sought, which has delayed this legislation and has prevented higher grades of rank being secured, namely, those of captain and major.

While familiar with the history of all the efforts made in this matter of legislation, as published in the reports of the committees intrusted with this work at various times, I will not assume the prerogative of the present Legislative Committee, Drs. Crenshaw, DeFord, and Rodgers, under whose administration the final success has been accomplished, by attempting to indicate the policy pursued or to mention any of the friends in and out of Congress to whom the profession is especially indebted. The results obtained are in themselves a reward for the energy and sacrifices made to accomplish their fulfilment. There are, however, other deeds to be performed, standards to be established, and scientific problems to be worked out, and I am sure the sentiment of all present is for a continuous forward movement. Let us, then, with renewed zeal press on to the final goal—perfection.

Thanking those responsible for this opportunity to speak for you and to you, I bring you a cordial greeting from the profession in Washington, and regrets from several men who were anxious but unable to be present with us on this occasion. [Applause.]

The next order of business was the calling of the roll of members.

Dr. B. Holly Smith moved that the calling of the roll be dispensed with, and that the association proceed to other business. (Motion carried.)

The next order of business was the reading of the minutes of the last annual meeting.

Dr. V. E. Turner moved that the reading of the minutes be dispensed with, these minutes having been published in the printed Transactions. (Motion carried.)

The first vice-president, Dr. W. H. Scherer, Houston, Texas, was called to the chair, and the president, Dr. H. C. Hassell, read his annual address, as follows:

PRESIDENT'S ADDRESS.

By H. CLAY HASSELL, D.D.S., Tuscaloosa, Ala.

THE earnest, whole-souled greetings which have been so cordially tendered to us this morning should be a real inspiration to each one to do his very best to make this meeting the great success to which our noble profession is entitled, and which is expected from this, its representative body in the South. As I look into the many earnest faces of those who have gathered here, and think of the program offered for your consideration, I am constrained to believe that you will do your part well and valiantly.

I should be remiss in my duty, as well as delinquent in regard to my opportunity, did I not use this occasion to express to you my grateful appreciation of the high honor which you have conferred upon me by calling me to preside over the deliberations of the fourteenth annual meeting of the Southern Branch of the National Dental Association, or what would have been the forty-second meeting of the Southern, of which this association is a direct continuation.

The old Southern was organized here in Atlanta in 1869, and has with its successor been one of the most potent factors in bringing the dental profession out of chaos and putting it on the ethical road to constantly increasing usefulness and responsibility toward the public. Its members have assiduously led in the evolution which we have been undergoing, from itinerant extractors and plate-makers, through many trials and tribulations, until this good day when we are permitted to stand upon the mountain-top and view the land of promise, the dental millennium—prophylaxis.

ORAL HYGIENE.

Your Committee on Oral Hygiene will properly present this subject for your consideration, and I shall not anticipate their report; only let me urge that, in my opinion, this is in reality the highest possible aim of all branches of the healing art; and those of acute conscience will find more and more labor in this field. Nor shall it be love's labor lost, for the public is becoming aroused to the idea of prevention as never before.

APATHY OF MEMBERS.

The views expressed by Dr. Thomas P. Hinman, in his presidential address delivered before this association at its meeting in Nashville, Tenn., in 1901, so fully coincide with my own views on the present situation that I shall quote him, as follows:

I believe that the Southern Branch is at a critical period of existence, and we must either devote ourselves more fully to its upbuilding or abandon it entirely, as it can never exist and be a success in the present lukewarm condition of so many of its members. What we can do to enliven interest and make our meetings more attractive to the rank and file of the profession is to get a full clinic list, and meet in large central cities where railroad facilities and hotel accommodations of all description are readily found. I find that most of our committees have been very much hampered because of the failure of the members to answer communications addressed to them. This should not be so, as every member of the association should be in duty bound to acknowledge such communications.

You will recall that we had no meeting of this branch in 1909, owing to the meeting of the National in the South in that year.

At a business meeting held at that time by the Southern Branch, the incumbent officers were re-elected for the ensuing year, and an invitation from the Texas Dental Association to meet with them in 1910 was accepted.

The members of the Texas Association have the real "Texas heart," and entertained us royally, but the flagging interest due to the fact that no meeting had been held in 1909, and the great distance of Houston, where the meeting was held, so affected the attendance as to make it distressingly small. This left the association in no position to select for itself a place for holding the meeting this year, that duty being left to the Executive Committee, which was not able to make a wise selection of time and place until some time in October. At that time the affairs of your executive were in such chaotic condition that it was not until the latter part of November that committees could be appointed, and January had arrived before any systematic work was begun by the committees, owing to the great difficulty which was experienced in procuring chairmen for the various committees.

This necessarily crowded the work of preparing for this meeting into a very brief space of time, and but for the zeal and untiring interest of those who finally accepted appointments to committees, we could not have offered you the splendid program which has been secured for your consideration at this time. I wish to thank publicly each chairman and the members of all committees who have worked so ardently and faithfully for the success of this meeting.

I feel sure that I am voicing the sentiment of every member when I extend the official thanks of the entire body of members of this association also to those who have so kindly prepared papers and clinics for this meeting, and especially to those who have not the good fortune to be residents of the territory embraced in the division of the Southern Branch.

NATIONAL REORGANIZATION.

The plan of reorganization of the National Association seems so feasible and desirable that I recommend that the Southern Branch encourage and foster in every way the consummation of this object, especially if the plan can be so modified as to allow state associations to become components of the branch in whose territory they may be located; otherwise the strength and usefulness of branch organizations would be materially reduced, if not rendered entirely useless.

The National journal contemplated in the reorganization scheme, I consider of the utmost importance. In it, I believe, should be published the transactions of all component associations as well as those of the National, if it be practicable,

thus representing a complete source of information and reference as to the work and progress of the dental profession throughout the entire country.

There seems to be some diversity of opinion relative to a resolution passed by the National Association at Denver last year, setting aside annually one dollar from the dues of each member of the association for the use of the journal which is to be published by the association.

It might be well for us to put ourselves on record as favoring this appropriation, stating that it is our understanding that we, as members of the Southern Branch of the National Association, are included in said appropriation.

PLACE OF MEETING.

I wish to urge that in the future a definite place of meeting for the succeeding year be selected before adjournment, thus relieving your officers from the embarrassing duty of hunting a place for the ensuing meeting. This situation might be obviated in the future by selecting some city, well located geographically, as the home of this association, at which place all meetings would be held unless an invitation to meet in some other city is accepted by this association during the last preceding meeting.

If you should consider this suggestion, it would be well to have a committee thoroughly investigate the availability of various cities, and it might even prove feasible to subdivide the Southern territory into two or three divisions, somewhat after the plan of the National, but with a home city in each division, and to hold the meeting in the home city of that division in which it is due to be held, unless some other city be selected at the previous meeting.

PROGRAM COMMITTEE.

I find that no provision is made in the constitution for a program committee, and that no authority is invested in any other committee or officer to arrange the program for our meeting. I think this should be remedied in some way, either by designating some one of the present committees or by creating a new committee for that purpose.

I am inclined to favor the restriction of committees as much as possible, and would advise that this work be assigned to a subcommittee of the local committee on arrangements.

This seems desirable because so much of the detail of the meeting has to be worked out and arranged by that committee, which is in the best position, for the reasons set forth, to do the whole work with a perfect understanding of the local conditions.

With this idea in mind I requested the Local Committee on Arrangements to arrange the program for this year, and forward it to the recording secretary for final editing, publishing, and distributing among the members.

PUBLIC HEALTH.

The necessity of employing every means known to science to conserve the health, happiness, and well-being of the future generation would seem to render it imperative that the government establish a department of public health in the very near future, and I hope that the members of this association will use every influence, collectively and individually, to influence favorable action on such measure by the next Congress.

While it may not be possible to have dentistry specially recognized in any

public health measure before Congress, the fact remains that the department, when once established, inevitably would soon be compelled to take cognizance of the necessity for the collaboration of the dental hygienist with the other departments of research and public instruction.

This recognition has already been accorded by the department of public health in the state of New York, and other state and city health departments necessarily must follow suit.

PUBLIC DENTAL EDUCATION.

The need of public education in the care of the mouth and teeth for esthetic, physical, mental, and moral reasons is so patent to every observing member of our profession that it would seem unnecessary to call your attention to this subject, except in order to point out some of the progress that is being made.

The most notable feature in this progress is the Forsyth Dental Infirmary—"dedicated to the children"—founded by John Hamilton and Thomas Alexander Forsyth, in memory of their brothers, James Bennett and George Henry Forsyth.

This will be a magnificent building, most perfectly constructed and equipped, located on the Fenway, one of the beautiful park sites in Boston. In addition to the cost of building and equipment, there is an endowment of approximately one million dollars for the maintenance of this institution, which insures its continuous usefulness to the worthy poor children of Boston and vicinity, as well as its being a permanent center for the general dissemination of oral and general hygiene. A research fellowship has been established for technical and scientific research.

Let us hope that this munificence may soon be emulated, if only in a smaller way, in many other cities of our country.

Nor should these matters be looked upon as charity. "The world recognizes the right of children to development mentally at the public expense. The question of their equal right to physical development is now receiving some attention."

ARMY DENTAL SERVICE.

The new army dental law which was enacted during the last days of the sixty-first Congress is a great gain and improvement over the previous law, though it is not all that we may reasonably hope for in the future.

It has required only ten years to demonstrate the claim of the dental profession that the preservation of the structural integrity and functional efficiency of the teeth and mouth of the soldier is essential to full army efficiency, and that the army dentist is entitled to status and compensation commensurate with the value of his service and the importance of his office.

Under the new law the dental corps will be practically doubled in number, thus lessening the responsibility of each member, while increasing vastly the general efficiency of service of the enlisted soldier. Commissioned rank is provided for, with fixed military status, and pay and other allowances such as are granted to officers of similar rank in the army medical corps.

All in all, this is such an advantageous modification of the status of the army dentist that, while hoping for still greater improvements in the future, the dental profession should accept the present law with some measure of gratification, and with full appreciation of the splendid

service rendered by those who have labored so earnestly and successfully for the improvement of the status of the dental profession in the army.

MILLER MEMORIAL.

The Ohio State Dental Society inaugurated, a little more than a year ago, a campaign to raise approximately eight thousand dollars for the purpose of erecting a suitable American memorial in honor of the late Dr. Willoughby D. Miller.

At this time less than half that amount is in hand, and as it is not deemed advisable to take steps to erect the memorial until the full amount has been secured, it would seem a matter of honor for every member of the profession, collectively and individually, to help in this laudable undertaking, since all have benefited from the scientific research work of Dr. Miller.

OBITUARY.

The absence of our friend and coworker, Dr. Joseph P. Gray, brings a pang to the heart of each one of us. He was a friend of all; to know him was to love and esteem him. He has gone on a long journey with the angel that beareth the scythe, to explore and try the land of mystery from which no traveler may return; nor shall we greet him more till the same angel beckons us on the journey that passeth our understanding.

Dr. Scherer appointed as the Committee to report on the President's Address Dr. B. Holly Smith, Dr. Frank Holland, and Dr. S. P. Sharp.

The president, Dr. Hassell, resumed the chair, and motion was made and carried to adjourn until the afternoon session, 2.30 o'clock.

TUESDAY—Afternoon Session.

The afternoon session was called to order at 2.30 o'clock by the president, Dr. Hassell.

The President appointed the following Committee on Revision of the Constitution and By-laws: Dr. A. R. Melendy, Dr. W. G. Mason, and Dr. W. K. Slater.

The next order of business as announced by the President was the reading of a paper by Dr. W. A. Lovett, Birmingham, Ala., entitled "Microscopical Introspection: A Review of the Present Status of Dental Education." [See following page.]

Microscopical Introspection: A Review of the Present Status of Dental Education.

By Dr. WILLIAM A. LOVETT, Birmingham, Ala.

In responding to the request of my committee chairman for a paper to be submitted for the consideration of this section, I feel justified in offering an apology, as the invitation came to me just two months ago, and as I am not a trained bacteriologist, microscopist, or physiologist, I could not, upon such short notice, furnish you with an essay based on accurate information the result of years of patient effort in research work, such as is found in numerous text-books that are admittedly authoritative on these subjects.

CRITICAL ATTITUDE AS A CONDITION FOR SCIENTIFIC PROGRESS.

The acceptance or non-acceptance of such admittedly "authoritative" statements without personal investigation, with a view to learning whether or not these statements are correct, involves the advancement or retrogression of the profession of dentistry.

Had the entire medical profession accepted as truths the statements of early investigators on micro-organisms, bacteriology would never have progressed farther than to establish the fact of the existence of bacteria, without any classification or knowledge of their pathogenic or non-pathogenic nature, or any means of proving their identity. Numerous medical scientists have reported the results of their investigations, and I presume the large majority of the medical profession accepted each new statement as a fact until it was proved or contradicted by some other investigator.

During the time when the controversy was liveliest as to the doctrine of spontaneous generation of bacteria, Pasteur, in a letter to his foremost opponents, wrote: "In experimental science, it is always a mistake not to doubt when facts do not compel affirmation." To this doubting mind and inquirer after truth we are indebted for the series of experiments he made in the years following 1860, which were not only important in incontrovertibly refuting the doctrine of spontaneous development, but in establishing the principles of scientific investigation which have influenced bacteriological research ever since.

The same critical spirit that pervaded the scientific thought of that time in France is also well expressed by Oliver Wendell Holmes, who said that he had learned three things in Paris: "Not to take authority when I can have facts, not to guess when I can know, and not to think a man must take physic because he is sick."

The number of bacteriological investigators who have specialized in the oral cavity seems to have been very limited, and in our text-books on bacteriology the writers have relied largely upon the researches of Miller as contained in his "Micro-organisms of the Human Mouth," published in 1882, and the findings of Vicentini, Goadby, and a few others.

It would thus seem that as a profession we have stagnated practically since 1882, and have depended upon the medical profession for advancement not only in this science, but in physiology as well—for who has ever heard of a dentist conducting extended physiological experiments?

When I laid aside my old Dalton's "Physiology," published in 1867, I took it for granted that all of Dalton's analyses were correct, that nothing could be added to his three classifications of proximate principles, that no changes in food value have occurred other than the increased cost, that the laws of generation remain the same, and that the only problem confronting us today is the much-talked-of miscegenation between whites and blacks.

So it has been with most of us. We have taken much for granted, and in many instances we have not stopped to critically observe, seriously reflect, or compare. Our examinations have been wholly macroscopical, and we have depended entirely upon text-book statements and routine manipulation in caring for our patients.

Someone tells us that tricresol-formalin will change the nature of the gases in pulp-canals and sterilize the area beyond the apical foramen, where putrescence exists. We accept this statement as a fact without stopping to inquire what particular kind of gas was produced from the proteid and carbohydrate constituents of the environment of bacteria. Certainly there are tissue changes continually taking place, and every observant dentist has noticed different conditions in dental pulps—the ease with which some may be devitalized by ordinary methods and the excessive pain these same methods cause in other cases, and the difficulty of devitalizing pulps in patients whose blood is charged with the malaria parasite.

If we experience pain or soreness from the application of tricresol-formalin, we accept the general statement that there was no putrescence in the canal, without taking cognizance of the form of gas that might have been present, or without investigating whether the condition existing was the result of pathological influences from the presence of aerobic or anaerobic bacteria.

This is but one instance in which we have accepted without question an authoritative statement. Time will not permit me to dwell upon the different phases of this part of my subject. I have nothing new to offer you as to the cause of so-called pyorrhea alveolaris, nor have I discovered the bacterium that may either produce or aggravate this disease, but I do want to say a few words—for which I expect to be censured—that may in the future lead to the discovery of this bacterium, as well as of methods of making cultures of other bacteria that have been observed in specimens from the human mouth, but for which no culture media have yet been found.

THE STATUS OF DENTISTRY VS. THAT OF MEDICINE.

I take it for granted that most of you have kept yourselves informed on the discussion of the question "How Shall the Stomatologist be Educated?" by such men as Eugene S. Talbot of Chicago, Jas. E. Power of Providence, R. I., and M. H. Cryer of Philadelphia, as contained in papers by these gentlemen read before the section of Stomatology of the American Medical Association, and published, together with the discussion of these papers by other prominent men, in the *Journal* of that association in its issue

of June 25, 1910. I shall refer to these papers later.

It is apparent to every thinking and observant member of the profession of dentistry that, in the minds of the laity and of most of the medical profession, we are classed as mechanics of but little higher order than the watchmaker or locksmith. This is rather rudely put, and may be shocking, but it is eminently true when we take into consideration the profession as a whole. Each member must demonstrate to his professional brethren and the laity that he knows something more than mere mechanics.

If you think for a moment that I have exaggerated my statement, join for the nonce a party of medical practitioners who are discussing some phase of medicine, surgery, physiology, chemistry, therapeutics, histology, pathology, microscopy, etc., and, if you have not already shown your ability to discuss with them these subjects, it is presumed by them that you do not have a sufficient knowledge of these sciences to discuss them with intelligence and accuracy, and you cannot help but realize just how little they think of the profession of dentistry from a scientific standpoint.

We may poke out our chests as much as we please, and tickle ourselves under the chin in an effort to make believe that we are on a par with our medical brethren in the public mind, but the fact remains that our medical education has not been as thorough as theirs, and if we have not assiduously endeavored to attain proficiency in the study of medicine after leaving college, we cannot expect to be treated as being intellectually equal in these subjects to men who have spent four years of serious effort in an endeavor to master the sciences which they are to practice, while we have only devoted three years to the study of these subjects in a superficial way, the greater part of our time being devoted to the mechanical phases of dentistry.

Each year it is becoming more difficult to obtain the degree of M.D. Each year more work is being added to the curriculum, and greater effort is required. The recent report of Dr. Flexner, of the Carnegie Foundation, on the equipment of the different medical schools, number of professors, number of paid teachers who devote all their time to the teaching of medicine, amount of endowment and revenue from matriculants and other sources, the equipment for and methods of conducting physiological and biological experiments, etc., will do much toward increasing the efficiency of medical schools by combining the smaller schools, or closing them, and concentrating the best ability of the medical teachers in those schools that are properly equipped and sufficiently endowed to impart medical knowledge.

This will be only another instance of the application of the law of the survival of the fittest, with the result that the medical profession will reap a greater harvest of splendidly prepared young men to begin the practice of their profession than has ever yet issued from the medical schools. I am aware that much has already been said concerning dental education, and that the colleges are ever ready to point out the advances that have been made in teaching during the past twenty or twenty-five years. To my mind, however, the profession and the public would benefit very much if at least half of the dental schools now existing were abolished, and the other half were required to come up to a standard

far above that which they now maintain.

THE NATIONAL ASSOCIATION OF DENTAL FACULTIES ARRAIGNED.

I charge that the National Association of Dental Faculties is nothing more nor less than a trust for the teaching of dentistry. It is not responsible to the profession for the requirements for entrance into the schools it represents, and it is not responsible to the profession for the kind of men these schools graduate. It can fix the time to complete the course to five, six, or ten years; or, if the number of matriculants decreases perceptibly, as it did when the course was extended to four years, this association can reduce the number of years to three or two years. With few exceptions a uniform scale of fees has been adopted, so that each school will have an equal showing in the procurement of students. To be sure, certain requirements for entrance are supposed to exist, but so eager are most schools to get students that I feel safe in asserting most positively that in the large majority of our schools no attention is paid to these requirements, and these schools welcome the scholars with as much gusto and "come-on-in-the-water's-fine" cordiality as the green-goods men do a new recruit and prospective victim.

If a dental college does not join the "union," its graduates are not recognized by the different state boards of examiners, and while the members have the power and are supposed to visit the different schools, to examine their equipment and method of teaching, the result of such privileges and general oversight has not been shown by any marked increase in the efficiency of many of our schools.

EXPURGATION OF DENTAL COLLEGES DEMANDED.

Since the report made by Dr. Flexner quite a number of inferior medical schools have closed their doors; some have combined, and strenuous efforts on the part of other schools are being made to come up to requirements in point of equipment and efficiency, so that they may be recognized by the American Medical Association. The requirements for entrance into the National Association of Dental Faculties must indeed be very meager, for I have never known of any school being refused membership. There may have been instances, but if the schools that failed to secure recognition were any worse than some which I know to be members, they must have attempted to teach dentistry in somebody's backyard or cellar.

These are harsh statements, some may say, but the time has come for someone to speak boldly on this subject, and, as the opportunity is now offered me, I could not resist the temptation of placing on the slide for the occasion this unique specimen of professional pride, our dental colleges, and if it would seem that the methylene blue has besmirched them for the time being, let us remember that a little alcohol will cleanse the slide perfectly, and while we have the specimen before us, let us, as it were, make a differential blood-count and seek to apply a remedy that will bring about a normal condition in our educational system. And whereas we now have a decided pathological leucocytosis, let us inject into it a little leucocytic extract, with the hope that we may have increased phagocytosis and ultimate elimination of the undesirable *bacillus inferiorum collegiorum dentalium*. If it is not possible for us

to destroy the spores of this germ by this method, let us wash out or attempt to wash out every vestige of the old *régime,* and start out anew on a higher and broader plane.

I appreciate the fact that there are several good schools, and that we are powerless to take from the inferior schools their charters, but as a profession we can institute an investigation, demand a fixed standard, indorse only those schools that come up to our requirements, secure interstate exchange of license for the graduates of such schools who have passed state boards that also have met our requirements for examinations of applicants for license, and in other ways bring about conditions that would insure the advancement of dentistry as an art and a science, and raise it from its present position to that of a learned profession.

Not until we do this shall we bring into the profession men who, taken in the aggregate, have sufficient educational qualifications to enter upon the study of dentistry; and these men, when they at last emerge from our professional schools, will adorn and honor the profession and will be fully equipped to think for themselves, and thus, by their competence, to experiment along scientific lines and to examine into the scientific phases of dentistry and stomatology without having to repeat like parrots what some recognized authority has stated as a fact.

Some of our schools are nothing more than parasites feeding upon the credulity of young men who have had pictured to them in glowing terms the ease with which they may obtain wealth and distinction. Many of these schools—I might safely say the majority of them—were organized for the sole purpose of elevating the founders from the ranks of ordinary practitioners to the exalted position of college professors, with the concomitant effect upon the public mind of securing them greater patronage, and to make money from the fees of matriculants and the infirmary practice. Rival schools are started for the reason that there are not enough places for college professors, just as courts are created for the distribution of more political plums.

As evidence of the lack of thoroughness in teaching the fundamental principles of medical science to those seeking the degree of D.D.S., I have but to cite to you lists of members of our college faculties. With but few exceptions the teachers of materia medica, anatomy, physiology, biology, histology, bacteriology, general pathology, microscopy, surgery, etc., are men who have obtained the degree of M.D., while the teachers of chemistry usually have the M.D. or A.M. degree. Why is this the case? Because the men who have obtained the degree of D.D.S. have not, as a rule, had sufficient training in these studies to fit them to be teachers. It is an acknowledgment on the part of the colleges of an inadequate teaching of the science of medicine. The medical men appreciate the importance of fundamentals, and undertake their work seriously.

There is an old saying, "What you learn, learn it well: what you know, you can tell." The failure of dental students to learn well these medical sciences is responsible for the chairs of these branches in our dental colleges being filled by medical graduates, and this acknowledgment of the unfitness of dental graduates to teach dental students is a sad reflection upon our educational system. I could rest my case upon the fact of the

existence of this one condition and feel assured that my contention has been sustained.

But you say, We have some dental colleges that have dental graduates as professors to teach these branches. I grant that this is so in a few instances, but I contend that these branches are not taught as thoroughly as in the medical schools, and challenge any dental college to take its first, second, and third honor graduates of the present session and place them beside medical men who may go before medical examining boards for license this year, for the purpose of proving that these dental schools are giving as thorough instruction in these branches as are the medical schools.

MEDICAL EDUCATION FOR THE DENTIST ADVOCATED.

I have already asserted that a medical education for the dentist is essential, especially if we would equip our young men to meet the exigencies of advancements that will be required of us as a profession. It is essential if we would place our profession among the list of learned professions, and be classed as the equals of our medical brethren. As further proof of the necessity for more accurate and thorough medical preparation for the dentist and stomatologist, I shall refer you to the papers already mentioned and ask these questions: Who are the men in the dental profession who have gained the greatest distinction in the scientific phases of the profession as well as in mechanical art? Which men have done the most to elevate dentistry to its present standard? Are they not men who began the study of dentistry with a good scholastic education, and is it not a fact that those who have national and international reputations and are recognized as authorities in the dental profession are men who have obtained the degree of M.D.? Look into the hall of fame of our profession, and see who these men are and what they have accomplished.

It is not my purpose to discuss here just how the course of study should be arranged. That feature may be attended to after the profession has been awakened to the importance and necessity of bringing about a reform in dental teaching.

All of us understand the difference between an oculist and an optician. Any person with ordinary intelligence, after a week's training, can take a test case or even one of the long, graduated appliances used by opticians, and approximate the proper adjustment of lenses to eyes when there is no muscular defect. I am told by medical men that diseases of the eye, ear, nose, and throat are the easiest branches of medical practice, and yet an M.D. degree is required to practice such specialties, and, as a rule, medical men do not specialize in these branches until after having engaged in the general practice of medicine for a number of years. Why? Because they are then better prepared to specialize, as they can more readily discern the remote causes for the manifestations of disease conditions of the eye, the ear, the nose, and the throat.

In the same way no one should be counted as qualified to practice dentistry who is not a trained stomatologist, and no one can become a competent stomatologist who does not know anatomy, physiology, histology, bacteriology, microscopy, chemistry, materia medica, and therapeutics, the diseases of women and children, the practice of medicine, surgery, etc.

Watchmakers and jewelers would make splendid dentists without having to learn

more than a little of the usual subjects taught, other than dental anatomy and pathology, and they could acquire sufficient knowledge of these branches in two or three months to qualify them for boring holes in teeth and inserting fillings. Very often these men are opticians, but none of them would be permitted to treat diseases of the eye, ear, nose, and throat. It seems to me, therefore, that we should think enough of our profession to endeavor to put it on a par with the medical profession, and thus equip men to practice scientific dentistry, leaving the mechanical part to the laboratory man, who may, if he desires, do watch-tinkering on the side.

I do not wish to be understood to mean that I do not appreciate dental art and the importance of knowing how to properly fill tooth cavities. I do appreciate its importance, and am aware of a woful lack of expert technique on the part of many dental practitioners, who, if they understood more of the subjects I have mentioned, would be able to accomplish more satisfactory results in the application of mechanics to the art of dentistry.

THE ADVERTISING QUACK.

While we have the microscope focused on the profession, let me present another specimen of bacteria, pathogenic to the profession and aerobic in nature, taking from the profession the pure oxygen of truth and converting it into carbon dioxid—victimizing thousands who would reap the benefits of expert dental knowledge and skill, but who, coming in contact with these most dangerous and poisonous micro-organisms, are lulled into a belief that there is nothing to dentistry but graft, that all dentists are alike incapable of preserving tooth structure, and that it is utterly useless to attempt to save the dental organs.

This specimen is the advertising quack, of whom you have all heard, and whom, no doubt, you have seen plying his nefarious schemes to filch from an innocent public its hard-earned money. I shall not dwell on the different plans employed to lure people to the offices of these men, nor on the methods used to extract the maximum amount of money from each victim.

The medical profession of Alabama has attempted to find a legislative germicide that would stop the fermentative changes caused by this form of parasite in the medical practice in the state, but at present the remedy has not been found, or, if found, has not been applied because of the fact that it is most people's nature to want to be humbugged, and to undertake to kill this form of bug would bring criticism upon the profession.

I am of the same opinion as has been expressed by some of their ablest men—that a man's diploma and license are his property; he has worked for them, earned, and paid for them—in fact, "he has a deed to them." Certainly no law could be passed that would take from him his property in the event he should become unethical, for the reason that it *is* his property, and such a law would be *ex post facto*.

PROPOSED CONTRACT BINDING THE DENTIST TO ETHICAL PRACTICE.

But there is a way to stop the growth of this bacteria, thanks to the fact that the theory of spontaneous development of bacteria has long since been exploded. This may be accomplished by fractional sterilization. We must be content to destroy the spores of this germ by degrees.

In a general scheme to better our edu-

cational facilities, why not have the colleges adopt a uniform contract, to be entered into between the dental colleges and the matriculants in their freshman year, whereby each matriculant agrees to conform strictly to the code of ethics adopted by the profession, and that if he violates his contract at any time after graduation—up to ninety-nine years, which I believe is the time limit for contracts—or is guilty of unprofessional conduct, the college issuing his diploma shall have the right, when proof of such breach of contract or unprofessional conduct has been presented to its faculty, to recall the said diploma, and to publish in the various papers of his home town, city, or county the fact that his diploma has been rescinded? In this same contract let it be understood and agreed that the state board issuing the license for the practice of dentistry shall have the right, without notice, to rescind such license, upon properly attested notice from the holder's alma mater that he has forfeited his diploma by reason of his breach of the contract which was made between college and student, in consideration of the fees paid to the college on entering. Should a student change schools before graduation, he should be required to present a copy of his original contract and to renew it with each college he may attend until graduation.

In this way I believe we can destroy this disease-producing germ, as by stopping propagation the foci of infection will finally be eliminated.

Let me admonish every member of the profession to do some personal microscopical introspection. The personal equation is a great factor in building up our individual practices, and upon this same personal equation of the individual members of the profession rests the power to uplift or degrade it. Your presence here denotes an aspiration on your part to broaden your professional knowledge, and to lend your aid to the furtherance of every movement that may be for the best interests of the profession. I am sure that none present is so egotistic as to believe he knows all there is to be learned of medicine and dentistry—the know-it-alls have remained away. I am sure we all desire improved conditions in our educational system, because most of us have been and are feeling our incompetence to undertake research work that calls for extended and accurate knowledge of the branches of medicine mentioned.

While we are striving to educate ourselves to be more proficient in our knowledge of the science and art of dentistry, let us, at the same time, educate the public to a proper appreciation of our services.

THE QUESTION OF FEES.

I know it is considered almost a crime to discuss on the floor of our conventions the question of fees, yet there is, as it were, a moving picture before me, and I want every dental surgeon to see it as I observe it presented at this time. We dentists do operations which, in point of time, expert technique, cost, etc., exceed or at least equal the time, skill, technique, and cost of performing an appendectomy, hysterectomy, and quite a number of other operations done by general surgeons, and whereas they receive anywhere from $300 to $1500 or $2000, and possibly more, for any of these operations, which require perhaps one hour of their time, we are called "grafters" for charging a nominal fee for the treatment of an abscessed tooth that requires in all seven or eight hours and possibly

more to complete. We are called on to stand by the chair for an hour or more and extract teeth under an anesthetic, and although we give our time, skill, and trouble we encounter a decided objection, because we make a charge of $5.00 for the operation and $5.00 for the anesthetic. There is no use of going into details. All of you have no doubt, at some time or other, had these experiences.

The object of these remarks is this: A man's skill, time, and knowledge is usually worth the price which he places upon it. If he does not think that he can do an operation as well or better than the best dental surgeon, he will probably fix the price for his services in proper proportion to the value which he places upon such services. People are fast learning that it is better to pay a man his own valuation than to go to one who cuts the price of another man's estimation of his own personal services.

Let the personal equation demonstrate what you are. If you are a dollar-an-hour mechanic, if that is your real worth, strike out for greater skill and efficiency, and ask for a raise in your wages. If you are incapable of doing as good work as the man who receives better fees, certainly you ought not to rate your services as high as the other man's, and the difference in price usually is the means by which people may ascertain your caliber. An eye, ear, nose, and throat specialist charges, as a rule, $2.00 for every office treatment. We are often afraid to charge $1.00 per treatment, because we are afraid of losing the patient. It is up to you to do as good or better work, if possible, than your brother dentists who are known to be expert operators, and if you can do this, you need have no fear of your charges driving appreciative patients to other men.

A DENTAL RESEARCH FUND DESIRED.

If you should take the pains, as I did while chairman of the committee on scientific research of my state association, to write to the Carnegie Foundation for the purpose of learning whether or not there is any provision for funds to be used in research work on the subjects of special interest to the dental profession, you will be told there is no such provision, and that such research work would not come within the meaning of the terms of Mr. Carnegie's gift for medical research. Who, may I ask, will look after our interests in making researches? The medical profession has troubles of its own, and you may be sure that the medical men will exert every effort and use all available means to solve the perplexing problems that confront their own profession, not ours.

We can, no doubt, if we show ourselves worthy, and can present competent young men to do the work, interest some one, maybe Mr. Carnegie, to set aside some of his surplus funds in aiding us to solve some of our own difficult problems, the solution of which would be of great benefit to humanity. Perhaps Mr. Rockefeller would pour some oil on the troubled waters, and, while we are looking for the hookworm, we might also endeavor to find the *leptothrix gigantea*, as observed by Miller in specimens from the mouth of a dog suffering with pyorrhea, and learn whether or not it is regularly present in the human mouth where this disease exists.

There are quite a number of questions which we would like to have definitely settled. To mention only one: How may we find a silicate cement that will take the place of porcelain without bringing down upon us the wrath and displeasure

of a host of patients in whose mouths it has failed?

CONCLUSION.

There is no need to parley about this matter. The time to weld a piece of iron is when it is hot. We have talked about dental education and listened to many papers on this subject in the past, and our colleges would look upon us with scorn as they exploited their great learning and advantages for teaching dentistry. Personally I am disgusted with that system that puts men from our good schools on a par with those from inferior schools that do not furnish a hundredth part of the advantages of the former.

Let us start now to correct this evil! Let us go about it in such a way as will bring results!

I hope that I have pictured our present status in its true light, that you will be able to see these conditions as I see them, and that you will come out boldly, earnestly, and determinedly, with a concerted effort to correct them.

The foregoing and the following paper were discussed together (see page 467.)

Dr. D. D. ATKINSON, Brunswick, Ga., read a paper entitled "The Dental Educational Standard," as follows:

The Dental Educational Standard.

By D. D. ATKINSON, D.D.S., Brunswick, Ga.

UPON this theme so much has been written and more said that I approach the subject only upon request of your Committee on Education. Nor do I expect to add any new ideas to the long list of dissertations on the subject, some of which are practical, some impractical, but all of which are directed to the same end, viz, the elevation of the professional standard. Let it be borne in mind that a profession, of whatever character, can assert itself in position on the social scale and in the public esteem only in proportion to the intelligence and culture required in the discharge of the duties and practices pertaining thereto, and that in any community the social prestige of any profession is largely determined by the character, moral and intellectual, of those who follow it.

On the other hand, while an established profession does to a degree loan its prestige to its followers, it in nowise acts as their social guarantor, but every man must determine for himself how much he is to be an honor to his chosen vocation, and thereby establish his individual position.

In a given community the lawyer with a cultivated intellect will stand socially above the dentist or the doctor who is not so cultivated; or the dentist who is cultured will stand socially above either the lawyer or doctor who is not so. Yet, at the present time, both the law or medicine enjoy, as professions, greater prestige among men than dentistry. It is this condition which is continually holding the educational problem to the front, for our professional leaders will never rest until they see dentistry co-equal with the greatest professions. This status will come. It must come through education. It is true that certain men are often pointed out who, though uneducated, have attained great eminence, and this

argument has been advanced to show that a dentist does not, after all, require so much of a literary education. But these instances are few and far between, and besides, these men have a genius which is not the gift of everyone.

I have on other occasions compared the effect of education to a growing field of corn. If a field of corn is planted and cultivated indifferently there will be a few stalks that will grow and bear good fruit in spite of the neglect; but the greater portion will be poor and bear only nubbins. On the other hand, if the field is well fertilized and well cultivated, there will be a few stalks very poor and fruitless, but the greater part will be fine, and the field will be an object of admiration. So in a profession of uneducated men a few will climb to prominence among their fellow men, but they cannot carry their profession with them, for its character must be determined by the great multitude below.

But if our profession is built of educated men, while there may be a few who remain in a position of mediocrity, yet these cannot impede its progress, and our profession will stand out like the field of good corn, and there will be no longer need for talk of elevating the standard.

OUR SOCIAL SYSTEM.

Dentistry in America has a rather complete organization, and it is through this system that the professional spirit must finally prevail. The supreme organic body, the National Dental Association, with its branches East, West, and South, is common ground upon which all practitioners from every state can meet on equal terms. Subsidiary to this are the state societies. Though these do not control membership in the great national body, their credentials are necessary for admission, thus establishing the national character of American dentistry.

OUR EDUCATIONAL SYSTEM.

We have in the United States about fifty-four dental schools, the majority of which are organized as the National Association of Dental Faculties. This association has a code of rules and controls to a great extent the operations of those colleges composing its membership. Out of this has recently grown a new organization, the Dental Faculties Association of American Universities, whose object seems to be to bring all dental education under state university control, with the hope of eliminating the strenuous competition for students, and building a student body of better educated men. How far they will succeed in this undertaking is a question to be decided by the future.

Intimately connected with this college system—not strictly a part of the educational system, but so closely allied to it that it is treated as such in this essay—are the boards of dental examiners, constituted under the laws of the several states and given authority to examine the candidates who enter the profession in their respective states, to license those whom they approve, and to refuse license to those whom they find deficient. These boards, like the colleges, are organized into a national association, but their national association carries no legal authority. This I call our educational system.

The dentist in his professional capacity is often called upon to treat maladies so closely allied to medical practice that some contend that the dentist should first of all be an M.D., and practice dentistry as a specialty of medicine. So strong is this feeling in the professional ranks that there may be said to be two distinct factions, one advocating the medical de-

gree and the other desiring a distinct and separate dental profession. The writer will not undertake to develop the arguments of either faction in this paper, but would contend for better instruction in the curricula already established.

The first rule of the National Association of Dental Faculties requires that each matriculant shall have passed a high-school course or its equivalent. He then enters upon his course of anatomy, physiology, materia medica, pathology, therapeutics, operative dentistry, prosthetic dentistry, metallurgy, chemistry, bacteriology, oral surgery, orthodontia, etc., and is given three years to complete the course.

The question of preliminary education has been worn threadbare, but, in the humble opinion of the writer, it is nevertheless the foundation-stone upon which the great national fabrics must be built, and is the paramount question of the hour. Were it left to my will, I would have every boy highly advanced in collegiate training before starting him on the professional course, but I would accept the high-school course as being adequate to the demands of society, as it places the matriculant in position to comprehend the lectures and the meaning of what he reads. It would seem that the man who learns enough of the subjects mentioned above to be reasonably conversant with them is in a very good position to enter upon the practice of dentistry, at least at the present date, and will appear as a reasonably well-informed man.

After an experience of twenty years on the board of dental examiners of Georgia, I have arrived at the conclusion that rule one of the National Association of Dental Faculties is not being observed. This conclusion is based upon observations gathered during the examination of students recruited from very many dental colleges. Indeed, in a discussion on the subject of dental education before a state society, I asked two deans how many students they had turned away for lack of preliminary education. One said that in twenty-five years he had turned away one, whom the other had subsequently accepted. This other dean had not refused any application. The two colleges whom these deans represent are quite up to the average, and yet they all complain that the boards are very exacting on their students. I cannot recall having ever heard of an applicant being refused on account of meager preliminary training except the above one, and I cannot believe that every man who has matriculated within the last quarter-century has had a high-school education or its equivalent, especially judging from many of the examination papers that I have had to read!

Send a child to a great factory, and all he sees is a great complicated mass of machinery which he cannot understand. So if a young man, who has not availed himself of the school facilities offered to him, and who scarcely knows how to read or to write intelligently, is placed in a dental college with Gray's "Anatomy," Kirkes' "Physiology," Remsen's "Chemistry," and all of those big books, he will feel perfectly lost. His mind has not been trained to study, and "he cannot and will not." These big books are to him a great complicated mass of writing, wholly unintelligible, unfathomable, and incomprehensible. The professional standard cannot be raised with such material. They were not students before, nor will they be afterward; they do not know the meaning of social amenities or esthetic taste,

and their light will shine only in the reflection of the gold crowns on the incisors of their unfortunate patrons.

Many of these men are refused license by the examining boards. Some of them go to other states, some engage in illicit practice and become the object of prosecutions, others are lost sight of. Of course a great many young men are graduated who would grace any profession, and it is upon these that our hope for the future must rest.

THE PROSPECT.

The signs of the times look better higher up the line. The movement of the university faculties may result in the production of a more finished dentist, just as the Boston Technological School, Princeton, Yale, and other great institutions turn out better scholars than do the smaller schools. The new N. D. A. Educational Council will no doubt be of great service, but, as an ultimate proposition, I am firm in my conviction that the greatest general good must come from a general and absolute demand from the examining boards that the colleges shall enforce their rule on preliminary examinations.

It will be noted that in this essay I have not advocated either the separate degree of D.D.S. nor the same degree in conjunction with the M.D., but with all my zeal I shall stand for the better education of the dentist. Apropos of this thought, I shall quote from Dr. N. S. Jenkins, that eminent scholar and practitioner who has done so much to illustrate American genius in Europe. In his concluding remarks in a paper read before the Dental Society of the State of New York, and printed on the front pages of the *Dental Cosmos* for December 1910, he has this to say: "I suppose no reasonable man in our time has a superstitious regard for the medical degree. 'The rank is but the guinea's stamp, the man's the gold for a' that.' But whatever degree we may confer upon our American dental graduates, it must come to stand for a disciplined and cultivated mind; for an education founded upon a thorough training in those sciences universally regarded as forming the indispensable basis for the practice of the healing art; for hands trained to execute the most cunning devices of the mind; for a body unwearied in the exercise of the most exhausting practice in the whole range of surgery; for a character in which patience and benevolence shall temper a noble ambition."

Education is the common heritage of the American boy. The schoolhouse is open to him almost from his infancy. The high school is ready for his maturer boyhood, and the state university beckons him on to a higher education. Many of our boys avail themselves of these opportunities; for such men dentistry offers a new and increasing field for thought, where industry and frugality yield good returns, where they can more and more cultivate the enlightened intellect which is the inspiration to an ennobled character, upon which is builded the highest type of citizenship, the last analysis of great manhood.

Joint Discussion of the Two Papers.

Dr. R. C. YOUNG, Anniston, Ala. Dr. Lovett's paper is so small yet so great that I scarcely know where to begin to discuss it. The paper begins with the microscope and ends with dental education. Many of my friends think that I am a crank on the subject of dental education; but why all this agitation on the subject

of dental education? Simply because we are under the most powerful microscope that any lens-maker could make; we are under the microscope of public opinion. Years ago man was satisfied to travel in an ox-cart or a sedan-chair, but today he is not satisfied unless he has an automobile, and in a year or two he will want airships. We are all progressing, and thank heaven the dental profession is progressing as much or more than any other occupation on earth. For years it has been the custom to criticize the dental schools. The dental schools have done a great work, but they will have to broaden their work now that the public is demanding more of us. We are no longer considered as watch-makers or tinkers; we are supposed to be men of higher education. We have conditions to deal with that the purely mechanical man cannot understand. As we stand today, the mass of us must take a great deal of that which is given us as we do religion, namely, on faith. This for two reasons: In the first place the dentist does not have time to keep up with the theoretical side of his profession; he works all day and when he goes home at night he is very tired and hardly able to read the ordinary literature of the day, to say nothing of dental literature. Virginia has struck the keynote of dental education, and I sincerely hope Alabama will follow the lead, and in time oblige every man who practices dentistry to acquire the M.D. degree first. How this is to be done I do not know; men abler than I can work that problem out when the time arrives. But why this feeling of unrest that permeates the profession at large? Because the conditions of the times demand a broader and more thorough medical education for the D.D.S. We shall have to educate ourselves to a higher degree, and we are going to do it. The mere fact of the public demand will force us to it, and we cannot shirk our duty. Italy, Austria, and France have enacted laws requiring every man who would practice dentistry to have the M.D. and D.D.S. degrees. Pasteur himself was not allowed to inject the serum that he found. He was not allowed to make a hypodermic injection, and was forced to engage a medical man to do it for him. Virginia is in the lead, and we are all going to get in line.

I do not want to be misunderstood as abusing the dental schools. They have their place, as the ox-cart had its place, but we have progressed beyond that stage now. The course, not so many years ago, was one of only two years, then it was made three, and then four, but the schools claimed that they could not maintain the four-year standard, because they would soon run out of material. But the time is coming when it will require more than three years to make dentists. In this connection I would have you understand that the dentist is born, not made. In twelve months I can teach any good mechanic to make exquisite mechanical operations, but I cannot make a stomatologist of him. But we want men proficient in both mechanics and medicine, who can treat disease and can recognize disease by its symptoms. The time is coming when many diseases will be diagnosed by conditions seen in the mouth, and we shall have to prepare ourselves therefor. We must therefore familiarize ourselves with the science of medicine, and build our foundation on pathology, therapeutics, materia medica, etc.

I am not begging for recognition, but am merely one of the steadily growing

number who demand what is necessary, a full medical as well as a dental education.

Dr. B. Holly Smith, Baltimore, Md. I want to commend the temper and the moderate attitude of the reader of the second paper. I did not hear all of the first paper, and it does not seem fair to enter fully into the discussion of a paper that I am not familiar with. It does seem, however, that the gentleman who read the first paper has not been entirely fair. Hysteria is a desperate disease to treat, but the association of that disease with certain other neurotic conditions complicates the treatment very seriously. A mere juggling of technical terms in an attempt to portray a view of certain conditions complicates the situation, but when by an essayist on the floor of a convention like this statements are made which can be controverted, and which are absolutely opposed to what we know as facts, I think issue should be taken on that ground. It is not at all uncommon to find fault with our social conditions; it is not at all unusual to have among our own friends and associates some man who lacks either temperance or honesty, but to denounce in a wholesale way our associates, and say that the whole social fabric should fall because of some irregularities or departures from the normal is not fair, nor do I think it wholesome. Our educational system has made of dentistry a specialty that has startled the world, and has accomplished that work as rapidly as, if not more rapidly than any other system of training for any profession that we have ever had any knowledge of; and now to have it abused, denounced, and misrepresented arouses my antagonism.

I am quite familiar with some of the best-trained, world-renowned specialists in medicine, members of the faculty of Johns Hopkins University, and thoroughly appreciate their ability, but I know the limitations of the medical men when it comes to our specialty. The necessity of the medical degree as a prerequisite to dental practice seems to me far from proved.

The second essayist is correct in his views as to preliminary education. We want men to be thoroughly prepared in a preliminary way, and nobody can possibly doubt the value of that preparation. It makes a man broader in caliber and gives him better judgment; it makes him more refined; it brings about a recognition of his own limitations, and an appreciation of the necessity for earnest effort. If he wishes to take the A.B. degree, he will probably be from twenty-one to twenty-four years of age when he obtains that degree. Suppose he receives that degree at twenty-one, then he must take a medical course of four years, and a dental course of at least three years, making him almost thirty when he begins his life-work.

European dentistry shows many fine students in the fields of special research; some of its practitioners have been well-rounded, accomplished, educated men, but when their technique and real ability to save teeth is compared with that of the American dentist, the latter, as everyone knows, is superior in real fitness for his calling.

The text-books used in dental schools compare favorably with those in any professional school. The training of a dentist must be a peculiar one; it must be given with an eye single to the calling for which it fits the student.

Dr. L. G. Noel, Nashville, Tenn. I have usually avoided entering into a discussion of educational topics, because I

have felt that I would rather sit and learn from those who have prepared the papers and from those who discuss them. I could not, however, refrain from saying a few words on this paper. I do not want the audience to feel that I am trying to get on both sides of the fence in the attitude I shall assume. I did not have the pleasure of hearing all of Dr. Lovett's paper, but heard enough to feel that he is dealing out to those who are endeavoring to teach the youth of the profession some rather bitter tonic, and I believe it will prove a tonic to all of us, and I shall take it as such myself. I have not been struck by any of the arguments leveled at the dental colleges, nor do I feel stung by the lash of his criticisms of dental schools. My attitude is to follow the trend of the profession, and perhaps I can demonstrate this best by citing a little of my own experience. I studied dentistry a good many years ago, when dental and medical education were unlike what they are today, but my old preceptor, who was one of the advanced men in the profession, often remarked that medical education was necessary to dentistry, and that dental education was only properly obtained by taking the medical course also. So instead of taking the dental course first, I was put in line for the medical course, which then required only two years of study; then I entered the dental school, where they made the mistake of allowing one year's advancement for the medical course taken, and so I had only one year in the dental school. Thus I had three years of study to prepare myself for dentistry, and yet my medical course, short as it was, proved a great help to me indeed. I made friends among the medical teachers, and among those with whom I came in contact in the clinics, and imperfect as the course was, it was a great aid to me. In endeavoring to prepare one of my own sons for the profession, I entered him first in the dental course, not because I did not think that the medical course should come first, but for fear that I might not be living to help him in establishing himself in practice. For this reason he took the dental course first, and after three years took up the medical course. It will take him one more year to finish, when he will have served seven years for dental education, and I hope he will be the better trained for it.

I know that the colleges will feel the lash of the essayist's criticism against the dental schools, but I believe it will prove a tonic if they will take it as such. We are endeavoring to uplift the profession, but Rome was not built in a day! nor the great cathedral of Milan in a year. It takes time to perfect education. Be patient, for we are endeavoring to do what we can. I have listened to criticism along this line for a good many years, and I believe it has done good. If we can only be patient, this problem will work itself out.

Dr. T. P. Hinman, Atlanta, Ga. There are some few points that I would like to make plain to this assembly, the first of which is that it takes time to accomplish anything. If I may be allowed for a moment to refer in a personal way to the subject of education, I will say that for twenty years I have been attempting to teach some subjects in dentistry, and in that time I have seen the rank and file of the student body so greatly improving that I am sure the colleges should be shown some appreciation for the effort they are putting forth for the betterment of the student and the profession, instead of continually being

lashed in the face with unkind criticism. The teaching chairs in operative and prosthetic dentistry and possibly metallurgy and chemistry, which a few years ago were very few, have increased in numbers until at the present time the dental colleges of the United States are as well equipped as, if not better, than the average medical college. The requirement of the degree of M.D. to qualify a man to practice dentistry is a fallacy. It is true that every man should have education, and I will admit that if a man has the M.D. degree it will help him somewhat in the study of dentistry, but to make a qualification of it is totally unnecessary. I have seen medical men, time and again, enter a dental college and attempt to study dentistry, and make the most egregious failures. The M.D. degree is not at all necessary; it is the man and not the degree that makes the dentist. I have observed year after year in teaching that the old saying that the dentist is born and not made is more than true, but what encourages me most is the class of men who today are coming to the dental colleges. They are better educated, men of greater refinement, and a great many have literary degrees. Indeed, every dentist in the United States should be proud of the present upward trend of the dental profession.

If the same effort were put forward in boosting and helping the colleges along and encouraging them in the good work they have done, as is spent in continually lashing them for their shortcomings, I am sure greater benefit would accrue to the dental profession.

Dr. Wms. Donnally, Washington, D. C. I would like to ask Dr. Talbot to state what part of the medical course the dental schools fail to include in their course that is essential to the education of the dentist? I know he has given a great deal of thought to this subject and is thoroughly capable of sustaining his attitude on this question. I would like to ask further if the medical colleges cover the field of general medicine more thoroughly than the dental schools cover the field of general dentistry?

I should also like to have someone explain, if he can, what this agitation for the medical degree means; what is back of it? It seems that there is in some quarters discontent and dissatisfaction with the social status of the profession, and if there is anything back of it more substantial than an ambition to attain a higher distinction for the profession and for the average dentist, I have been unable to notice it.

The medical college equipment, the medical course, and all else that enters the system of medical education in this country, is universally acknowledged to be inadequate and insufficient for preparing young men to practice general medicine or any of the specialties of medicine. How much more insufficient, then, must be the medical course to cover adequately the various subjects of dentistry!

I would like to see the medical degree based on a course recognized as fundamental and essential to each and every specialty or branch of the healing art, and to have on this base superimposed such courses of practical training as are suited to each of the several specialties now and hereafter practiced.

Dr. M. F. Finley, Washington, D. C. I would like to express one thought on the question of education and the claim that medicine is so far superior to dentistry in meeting the needs of the human race, and, with your permission, would refer to an individual case for comparison from the surgical standpoint as to

the value of medicine over manipulative operations by dentists. I will cite the case of the operation to perform which a certain celebrated surgeon of Europe came to this country, that of reducing a hip-joint dislocation, of long years' standing, without using the knife. For this operation a tremendous fee was paid, and the public press prominently extolled the operator and operation. I would like to have you compare that operation, in its benefit to the individual and the race, to what is done every day in the dental office in relieving the horrible conditions of malformations of the face which so frequently exist, and which are so detrimental to the individual and to the appearance of the individual in public; and if you then demand the medical degree in place of, or as a prerequisite to the dental degree, I pity you!

I am trying to look forward to the future, as I have a son whom I am preparing for dentistry. My intention is to first have him acquire a literary degree and then have him take up dentistry. He is now studying in the University of Michigan, in the third year of the literary course. The son of a colleague, who is present, is in the fourth year of the literary course in the same university. These two young men are taking that course preparatory to taking up dentistry, and I feel that the literary education is more essential as a preliminary for dental education than is medicine. These young men will know how to study when they come to taking up dental subjects and others claimed to be related to medical study. This kind of preparation is no more medical than it is dental; it is *science*, and when a man knows what is necessary in science he does not need to have the M.D. degree, he needs simply such branches of dental science as are necessary to qualify him for any situation that may arise in the practice of dentistry.

Dr. R. B. Adair, Atlanta, Ga. The question of dental education is of so much importance that I want to at least relate my experience. I belong to the old school, having been graduated from the old Baltimore College of Dental Surgery when some members of the old faculty were lecturing there, and some of the students in those days squeezed through the course in one term. I had been graduated and returned home less than a few weeks when I realized that I had made a mistake and that I should have studied medicine first. Indeed, it has hampered me all these years in the practice of my profession that I did not understand the fundamental principles of medicine better. I therefore determined not to allow my son to be hampered similarly, and had him educated first in the University of Georgia, then in medicine, and then in dentistry, and I know he is better prepared today to practice dentistry than he would have been if he had taken only the D.D.S. degree. It is impossible to understand one portion of the human body without a comprehensive idea of the whole system. The carotid artery and its function in the system of circulation, for instance, cannot be understood without a knowledge of the whole circulatory system. The same is true of the nervous system and all other parts of the body, consequently the man with the M.D. degree is better prepared to take up dentistry. That is my experience and opinion, and I hope these discussions and papers will be a stimulus to us, and that those of you who have sons will first have them take the medical course, and that professors in the schools will recommend that the student first take the M.D. degree.

Dr. E. S. Talbot, Chicago, Ill. My ideas on this subject are so well known that I do not think it necessary for me to say anything. As my voice is very weak, and I wish to do justice to my subject tonight, I ask to be excused from speaking at this time.

Dr. J. D. Patterson, Kansas City, Mo. I have been listening with great interest to the two papers, and feel very much depressed. The second paper I wish to commend. One statement was made in the first paper which I presume was meant in a humorous way, the essayist saying that he went to two deans of dental colleges to find out how many students had ever been refused admission in I have forgotten how many years; that only one applicant had been refused by one school, and he had been admitted by the other; also that he had never known of another applicant for admission to a dental college to have been refused. Such remarks, to my mind, prejudice the whole argument of the paper. The rest of the paper is very good, but that remark shows to me a spirit which I do not like to see. I have been attending dental associations for well-nigh forty years, and I have hardly ever attended a meeting of the National or of any large association where the dental colleges did not receive their usual castigation. I do not object to criticism; I agree with Dr. Noel that criticism should do good, but I most emphatically object to what I consider misstatements, probably prompted by ignorance. Such criticism never can do any good, and the first essayist, in my opinion, criticized colleges and dental education in a spirit which never can bring about the results which he desires, and which we all desire. He approaches the subject from the wrong direction entirely, and takes the position of the pessimist. I heard only the other day what I considered a very good definition of the pessimist—the pessimist is one who believes that whatever *is not* is right, and whatever *is* is wrong.

In both of the papers the keynote of the argument was the lack or inadequacy of proper preliminary education, and both essayists seem to admit that graduation from a high school is sufficient for entrance to the dental colleges. If that is sufficient, and if the rules of the Faculties Association are lived up to, then the fault lies with you, and not with the colleges. No applicant is admitted to our college until he has passed an examination, if he needs one, and his papers must be passed upon by the superintendent of public instruction, or a man appointed by him. That officer is appointed by you, and the faculty and the colleges have nothing whatever to do with that. He comes from the board, and the board is appointed by you, not by the colleges. Why, then, do you berate the dental colleges? If there is too little and insufficient examination to ascertain the status of the preliminary education of applicants, you are the ones responsible. Look to your state boards. Our board visits our colleges twice a year; they see what the college association requires, and make us live up to it. We have nothing to do with examining papers; even if a man has an A.B. or a B.S. degree, this is passed upon by the examiner. Now, is it not up to you? What has my college or any college to do with it?

The essayist says that applicants are not refused! There is no record from any college in Missouri in any year of its existence in which applicants have not been refused; three were refused in our college last year, one before examination, and two after. So it is to you, after

all, that this comes back. Yours is the fault if the colleges do not live up to the rules, and I am proud of being the originator of the rule by which the examinations were taken out of the hands of the colleges and put in the hands of an examiner, who is elected by you and your state board. Why, then, do you blame the colleges? If the colleges in the South do not live up to the rules of the Faculties Association, it is your duty and the duty of the state boards to compel them to do so. They can do it, because the laws require that the graduates of the colleges shall go before the boards for license. When it comes down to the last analysis, the increase in requirements for entrance to the study of dentistry and for graduation is due to the colleges, as I can prove to any unprejudiced mind. The colleges have from year to year gradually increased the requirements, and they have been urged to do so, not by the state boards nor by you, but by the National Association of Dental Faculties. That is the body which has exerted the greatest influence in raising the preliminary requirements. I can remember the time when a person could be graduated after having taken one course of five months; then the course was raised to two years, and then three. I remember when the examinations for entrance were given by colleges themselves, and when there was no parent body to regulate the standards of entrance. The examinations were afterward regulated by the parent body, which made a high-school course of one year the standard; later this was raised to two years, then to three years, and now the requirement is graduation from a high school or its equivalent, and this rule must be lived up to, else the fault is yours. The student passes through the hands of the examiner, and he is put into office by you through the superintendent of public instruction.

I have felt sometimes that there was excuse for criticism of colleges and college education, since we know that faults exist. But there is no association of men that does not have faults. Even the churches have faults; the highest and the lowest institutions in the land have their faults—but I object to the spirit of unjust criticism. I therefore hate to come here and get an unjust berating and a slap in the face which we do not deserve. If you will come to Missouri, I will show you that what I say is true. If the colleges anywhere in the South do not live up to the requirements in regard to preliminary education, it is your fault, because you can force them to do so.

Dr. H. B. Tileston, Louisville, Ky. It looks as if the college men are placed on the defensive today, judging from some of the remarks that have been made. I did not hear either of the papers, except a portion of the last one. The colleges always come in for their share of abuse. In attending dental meetings I often wonder why some men find it necessary to berate and criticize unfairly, as Dr. Patterson has said, those institutions which placed them in the positions they occupy today. It seems to me, from conversing with colleagues, that they are all proud of what they are pleased to term their alma mater, and they look back with pleasure and delight on the time when they passed through the halls of their college, and glory in the result of the educational system that brought them into the profession. And yet they seem to enjoy, somehow or other, going before a convention of this kind and criticizing, sometimes in an unpleasant way, those institutions to which they owe all they have.

I think sufficient has been said in defense of the colleges. With reference to the necessity of the M.D. degree, I would like to hear Dr. Donnally's question answered; that is, What portion of medicine that is not now taught in the curriculum of the dental colleges ought to be taught to make better dentists? I am at a loss to know what it can be. There is nothing in the medical curriculum that is useful to dentistry that is not now incorporated in the curriculum of the dental colleges of this country. We have culled out all that is of value to dentistry, and are presenting it in a concise form suitable for the needs of dentistry, and the student cannot get what he requires of medicine in any better way than that in which it is taught in the dental colleges in this country today, and what more could we wish. The necessity of demanding a medical degree as a preparation for the practice of dentistry, I am at a loss to see.

Dr. YOUNG. Who has made every advance in the science of dentistry—mechanics excepted—who has made every discovery that has been an advance in dentistry? Was it the D.D.S.? No, medically educated dental surgeons.

Dr. DONNALLY. Do you mean in medicine?

Dr. YOUNG. I mean in dentistry and medicine. Every advance we have made as a profession, not only in this country but in Europe, has been made by the M.D., D.D.S., and that is what we should be, and what we are coming to be.

I do not criticize the colleges; the college men are my friends, and I have had the honor of teaching sixteen years in dental schools and know that they are doing the best they can, but in order to be better educated men, we need to take not only the dental course but the medical course as well—we must have both. The public is demanding it, and we are going to have it. The time is coming when every man who practices dentistry will have to be a graduate of medicine as well as of dentistry.

Dr. DONNALLY. I would like to say in answer to Dr. Young's question as to the sources of the contributions to the advancement of medical science, that almost all of the advances in physiology, such as have come from vivisection, were due to the introduction of anesthesia by dentists. That is one example, and there are others. There is no medical man who does not recognize that, and does not admit that modern surgery, which gives such prestige to the medical man whether he practices surgery or not, owes much to that discovery and to that branch of the profession which demonstrated it.

Dr. YOUNG. Dr. Crawford W. Long, an M.D., who practiced in Georgia, was the discoverer of anesthesia.

Dr. DONNALLY. Inasmuch as the question has been raised as to who discovered anesthesia, I must say that the records show very clearly that anesthesia was discovered in this country by dentists and demonstrated by dentists, and the one who introduced ether anesthesia went about in this land instructing the medical men in the use of ether as an anesthetic in surgery. In fact, anesthesia never became generally adopted in the medical profession until, during the civil war, Morton himself was sent by the government to the different army hospitals to instruct the medical officers in the use of it. While I cannot cite offhand the numerous instances or give the names of dentists who have contributed to medical science, I wish to say that dentistry has done its full share, and a larger proportion than any other specialty

of medicine. Dentistry does not claim to cover the field of medicine, but it covers its own field more thoroughly and independently than any other specialty of medicine covers its respective field.

Dr. LOVETT (closing the discussion of his paper). When I began the preparation of my paper I fully realized that I would be severely criticized by some for my remarks. During an active practice of nearly sixteen years I have closely observed our educational system, and what I have said is the result of careful thinking based upon my own and other men's observations. I am sure all of you noticed that I was careful throughout my paper not to bring charges against any particular college. Everyone present knows that we have some good and some inferior schools, and we know which of the schools are good and which are inferior.

I am glad we have with us one gentleman who is willing to show us good schools, and that representatives of some of our best institutions are present. Dr. Smith objects to sarcasm, but is himself an adept in its use. I admit that I have used some figures of speech in which medical terms have been used to convey my thought, but deny that these figures were used for the purpose of misleading anyone. Dr. Smith calls it "juggling of words." If he, or anyone else, will take the trouble to unjuggle them, he will find that truth is underlying the whole fabric of the thought intended to be conveyed.

The question has been asked, What medical branches are needed that the dental colleges are not teaching? I think I went over this very thoroughly in my paper, laying stress upon the fact that the medical branches in our curriculum are not being as thoroughly taught in the dental as in the medical schools, and I specified what other medical subjects in my opinion dental students should be required to study, and gave my reasons for my position in this matter.

Dr. Donnally calls attention to the discoverer of anesthesia, and to him let me say that this is a much-mooted question. Both the medical and dental professions claim that anesthesia was discovered by a member of their profession, and I feel that if Dr. Donnally will take the trouble to look into the matter, he will not find a single work on materia medica, except perhaps Gorgas, that credits a dentist with that discovery. If he will go over to the state capitol in this city, he will find hanging there a life-sized portrait of a medical man who is credited with having discovered chloroform anesthesia, and I presume he is a Georgian.

Dr. DONNALLY. You will find in the National Museum in Washington a portrait of Horace Wells, the discoverer of anesthesia.

Dr. LOVETT. I certainly did not want to offend anyone, or, as Dr. Patterson says, "slap in the face" anyone attending this convention. I could not afford to bring definite charges against any school, and I hope the teachers present from those schools that are known to be good will, as Dr. Noel says, take this as a tonic, strive to improve on what they already have, and use every effort to get rid of those schools that are known to be inferior. There are schools today that accept applicants without even asking how far they have progressed in preliminary education.

Dr. Patterson's statement regarding the pessimist was very nicely worded, and I appreciated it very much. I think, however, that it more aptly fits the colleges than the man who merely protrays

existing conditions. The colleges consider themselves invulnerable, and no matter what you say, even in a spirit of friendly criticism, they tell you most emphatically that you are wrong and they are right, and thus they place themselves in the position of the pessimist which Dr. Patterson would attribute to me.

I freely admit that I am not as optimistic as the colleges seem to be, when it comes to a discussion of this question. There is not a man here who does not realize that there are colleges which have done good work, and I have great respect for these schools. I know teachers in dental schools who are doing their best to elevate the profession. I am not criticizing these men, but I am calling upon the dentists to come to their assistance in an effort to elevate the profession, and make us learn those subjects that will enable us to be better stomatologists and better dentists. Is there anything wrong in this? I cannot tell you all I know regarding some dental schools, because I would have to bring specific charges against the schools to which I would allude.

Some time ago I asked a gentleman who is teaching bacteriology in a dental school, and is also professor of bacteriology and microscopy in a medical school, how the course that was given to the dental students in bacteriology compared with that given to the medical students, and he replied that the dental course was not worth anything. There you have it, and I know that my informant told the truth. He said that in the dental school there were only three microscopes, and those without oil-immersion lenses; that the students could not stain a specimen, and that they would not know one after it was stained. Someone asked what studies were taught in the medical schools that were not taught in the dental schools; the aforementioned is one, and it is one of the most essential studies, and I claim that if the dental student is not taught in such branches as thoroughly as is the medical man, he is not being properly prepared to practice dentistry.

Dr. Atkinson (closing the discussion of his paper). I feel more complimented than chagrined by the criticisms of the several distinguished gentlemen who seem to have alluded to my paper. I will, however, take up one or two points made in the discussion, and answer them briefly.

Dr. Smith spoke of the text-books I mentioned as being the standard for the boards, and seemed not to have heard of them, or at least if he had heard of them, he did not consider them text-books for the dental curriculum. Some time ago the Georgia Board of Dental Examiners wanted to get a number of text-books for reference. I wrote to several colleges—and among these, if I remember correctly, was the Baltimore College—asking them for their announcements, and from the lists of books enumerated in the announcements that I received—perhaps a dozen or fifteen—I selected a number of text-books for reference by the board, and among that number were the three books I mentioned.

The idea seems to have prevailed throughout this discussion that in my paper I pounced upon the dental colleges, and have given them unkind slaps, but it did not occur to me so. I knew that mentioning examining boards in the presence of college men would be like shaking a red rag in the face of a bull. I had the red rag, and was not afraid of the bull, and I shook it. They have come at me with their horns down, but

I have been in the cow-pen before, and am not hurt yet.

The gentleman from Washington in his criticism—which I do not consider a criticism of the paper at all—emphasizes more strongly the idea expressed therein, namely, that preliminary education is absolutely essential to the professional degree. He considers it necessary to give his son a thorough literary education before he takes up the professional course, and why? Because it equips him to comprehend the problems that will come before him in his professional life.

A great deal has been said about preliminary examination and throwing the responsibility therefor on the examining boards. There may be a few exceptions, but the majority of the laws of the Southern states and the United States invest the boards with the power to grant licenses to the applicants as they come from reputable colleges, but these laws do not give the boards authority to go ahead of the dental colleges and inquire into the examinations preliminary to entering the colleges. It may be a rule of the National Association of Examiners to demand certain qualifications, but in my paper I stated that the association does not and cannot carry any legal authority. We have to deal with the students as they come from the colleges, and I can show you, gentlemen of the National Association of Faculties, from the examinations that we will hold in May and in June here in Atlanta and in Macon, papers which will convince you that these men who have been graduated have not had the high-school training that they are said to have. I will not single out any particular college. I have made that statement with all good faith, with no idea of deceiving or misleading, with no feeling of prejudice against the colleges. I am with them; my best friends are among the dental college faculties in Georgia and in other states; they do great work, but I insist today that, as a general rule, the colleges do not enforce the rule of the National Faculties Association which requires every matriculant to have a high-school certificate or its equivalent.

One thing puzzled me in the examinations of last year. In one of the examination papers, in answer to a question on the intestinal juices, I received this answer, "Surricus and turricus." I took Gould's dictionary and searched it carefully to find, if possible, what these words were supposed to mean, but could not do so. One of the other members of the board volunteered to help me out, and after looking in the dictionary for a little while, he suggested that "Succus entericus" was meant. If that candidate had had a high-school education or its equivalent, he would have known better than to write "surricus and turricus" for "succus entericus."

I insist first, last, and all the time, that if you are ever to build a profession that will stand high in the world, that will command admiration here and abroad and everywhere, you will have to build it from a student body of educated men.

Motion was then made and carried to adjourn until the evening session at 8 o'clock.

TUESDAY—Evening Session.

THE Tuesday evening session was called to order at 8 o'clock P.M. by the president, Dr. Hassell.

The first order of business for the evening session was the reading of a paper by Dr. E. S. TALBOT, Chicago, Ill., entitled "Developmental Pathology," as follows:

Developmental Pathology: A Study in Degenerative Evolution.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

WHAT is developmental pathology? "Pathology" is often medically and carelessly used to signify either pathologic anatomy or purely morbid processes—or, at best, disease physiology. As Virchow pointed out nearly two decades ago, "A transformation, a metaplasia, a change from one species into another, whether in individual animals or plants, or individuals or their tissues, cannot take place without anomaly; for if no anomaly appears, this new departure is impossible. The physiological norm hitherto subsisting is changed, and we cannot well call that anything else but an anomaly. But in the old days an anomaly was called *pathos,* and in this sense every departure from the norm is for me a pathological event. If we ascertain such a pathological event, we are further led to investigate what pathos was the special cause of it. This cause may be, for example, an external force, or a chemical substance, or a physical agent, producing in the normal condition of the body a change, an anomaly—pathos. This can become hereditary under some circumstances, and then become the foundation for certain small hereditary characteristics which are propagated in a family; in themselves they belong to pathology, even though they produce no injury. For I must remark that pathologic does not mean harmful; it does not indicate disease. Disease, in Greek, is *nosos,* and it is nosology that is concerned with disease. The pathologic under such circumstances can be advantageous."(1)

As the introduction of new functions or their potentialities into the organism is a constant phase of life from conception until the completion of maturity, factors tending to anomaly and requiring continual readjustment to the organism are constantly present. These adjustments require not only the entrance of new factors, but also the removal of previously dominant factors. These factors involve not merely ontogeny, or the development of the individual, but likewise phylogeny, or the development of the race. The last, in the metazoa or many-celled animals, particularly among the vertebrates, is subordinated to the first. While the central nervous system is a late acquirement, it appears in ontogeny long before it is required in phylogeny. The sympathetic system reverses

this, but its potentialities are early present in the metameric phase, mimicking the state of protozoa like the amœba. This state of things produces, as Roux (2) has shown, a struggle for existence between the organs, since the supply of assimilable nutriment is limited. The higher type depends, to some extent, on the initial velocity given it by heredity, aided by maternal environment during ovulation. This initial velocity implies proper balance between the developing and disappearing structures in embryogeny, particularly since this determines proper balance in initial velocity during the post-natal periods of stress.(3)

Developmental pathology, while rather extensively considered in surgery, in the domain of tumors, of orthopedics, and also in connection with abnormalities of the liver and of the bones so far as cervical ribs are concerned, has not received the attention which its relations to the etiologic moment of disease and disorder merit. The congenital states and their post-congenital possibilities are, to a very limited degree, recognized in the embryonic and reversionary explanations of cancer and malignant growth. To a still more limited degree, developmental pathology is recognized in hematology, since pernicious anemia is, by leading pathologists, considered a reversion to embryonic states. The alienists (4) have long regarded many of the psychoses as expressions of arrested cerebral development or of its post-congenital possibilities. The same is true of the so-called hereditary neuroses and psychoses. The other organ states have been less regarded, although both the gynecologists and the genito-urinary surgeons have shown tendencies to take the developmental pathology of these into account in dealing with the origin and consequences of morbid conditions.

The two great phases of developmental pathology have, however, not been used to the degree they should be as guides in the analysis of symptoms and consequences. While conditions in reversion have been considered to some extent, those occurring in phylogeny (race development) have not been separated from those occurring in ontogeny (development of the individual man). Ontogeny does not repeat all the steps of phylogeny, but assumes the essential characters of the race rather quickly. Very frequently the lower phases of phylogeny are, therefore, represented by potentialities capable of development rather than by the structures themselves.(5)

Developmental pathology, then, may be regarded as that domain of pathology which deals with departures of structures and organs from the normal along the line of arrests of fetal evolution, either in structure or in biochemic states underlying functions or potentialities of development at given periods of growth. Atrophies, with or without resultant hypertrophies, and *vice versa,* are underlain by its laws.

The general trend has resulted in a working hypothesis compatible with all pathologic phenomena of all the structures of the body, but more especially of the head, face, nose, jaws, and teeth, since they are more easily recognized. With this as a guide, the student can readily study the pathologic details of any structure of the body.

To comprehend the pathology of these structures, the laws of phylogeny must be understood. Phylogeny is that process by which an individual or structure is transformed from a lower to a higher

type. Man is still undergoing evolution; his structures are continually changing to suit environment. The Master-hand is adding a little here and taking away a little there, to adjust him to new conditions as they arise in the world. This process, which has been going on ever since man made his appearance, is still in progress.

Degeneration is a gradual decline of the structure in type. While the changes pertaining to evolution are in progress, man suffers more or less from his ignorance of the laws governing them, the proper understanding and strict observance of which would banish disease from the earth. His ignorance and consequent failure to readjust himself to changing conditions clog the wheels of evolutional progress, and bring about suffering and misery. Not only so, but during the progress of evolutional changes, various extrinsic obstacles are placed in his way, which not only hinder progress but cause degeneration in type of his structures. These obstacles consist in parental excesses, resulting in neurasthenia, intrauterine infections from parent to fetus, and eruptive diseases of the child.

In man's ontogeny, phylogeny and degeneration go hand-in-hand. An organ or structure remains with man, if and so long as it develops or aids in the formation of a new organ. The brain is an apt illustration. Degeneration of an organ or group of organs consists in a gradual restriction or disuse of structures, and their final obliteration or disappearance. The muscles of the ear, the vermiform appendix, the little toe, the false ribs, the pineal eye, and especially the face, including the nose, jaws, and teeth, are peculiarly involved in this process.

Progression can take place in the struggle for existence only through general development at the expense of disused organs. The structures of man are influenced greatly by environment. If he remain in a savage condition generation after generation, his surroundings being the same, he will retain, as a rule, certain fixed conditions of structure. Thus his brain will not develop; but, owing to retention of the primitive use of his jaws in masticating coarse food, etc., these will retain the size and strength of primitive life. On the other hand, if he abandon the savage life, develop his brain, and be not forced to masticate food, his jaws and teeth atrophy. A marked example of this in this country is the evolution of the negro in the past two hundred and fifty years from a dolichocephalic to a mesaticephalic head, and from a prognathous to an orthognathous jaw. Man, in his development from the lowest vertebrate, passes through all the vertebrate stages from fish and reptile to bird and mammal.

In his flight from cell to fully developed compound animal, man at the present period of his evolution has, as a result of a loss in explosive force, developed a nervous system. How well he accomplishes this development depends upon brain health. The brain of man develops first, to preside over the development of other structures. If the brain be normal, the structures of the body will develop normally; on the other hand, if from any cause the brain is abnormally developed, unstable, or defective, the structures of the body become abnormal. When arrests of the brain occur, different classes of degenerates result.

The structures of the nose and cavities of the face display much abnormality be-

cause of excessive and arrested development, due to their transitory nature and to an unstable nervous system.

In the development of man from the primitive cell, periods of stress constituting new environment occur. Those which occur during development are called periods of evolution, and those after maturity periods of involution. At these periods of stress, development of the nervous system may be strained, producing arrests of development or degeneration.

Structures undergoing arrests or degenerations are, because of lessened blood supply, more liable to disease than structures which are evolving higher. Marked illustrations of this may be found in irregularities of the teeth and disharmony in jaw development where the teeth are not being lost fast enough for the receding jaws. Interstitial gingivitis and decay are natural methods of hastening the process.

Arrests which occur at any period along the line of development account for all the so-called deformities of the body, which are reversions simulating some features of the lower animals, characteristic of fetal stages through which man has passed. No structures of the body are so prone to these arrests or degenerations as the face, nose, jaws, and teeth, since they are continuous in the line of evolution and are governed by the law of economy of growth in the struggle for existence between organs. This struggle between organs takes place among the animals as well as man. Wild animals in captivity and other animals through domestication—change of environment and food—have changes in structures similar to that of man.

States normal in lower animals have become abnormal in man.(6) This is of necessity modified by the increasing complexity of ontogeny or individual development in man as affecting phylogeny or race development. Not only are structures affected by these elements, but functions are likewise so modified without underlying structural change. Uric acid excretion, for example, normal in the sauropsidæ—birds and reptiles—has become abnormal in man. Its secretion by mammals is, as Fothergill shows, an abnormality with serious consequences. What is true of uric acid is likewise true of other products of suboxidation and imperfect elimination, like indican and excessive acid.(7) The presence of these clog, like clinkers, the working of the structures, and act in a peculiar, vicious circle to increase the conditions which produce them.

Biologic investigation shows that in the evolution of organs certain parts may disappear completely, but also that in the evolution of organisms certain organs may also disappear. This last phenomenon is most common in embryological development, when it is known as ontological abbreviation. Sometimes it is the adult stage that is suppressed, this being possible by what is called pædogenesis, a precocious appearance and ripening of the sexual organs.

Sometimes a degenerative transformation becomes still more complete and wonderful; not only may a larval stage or an adult stage be completely suppressed, but a multicellular organism may even lose its power of dying. It is known that the simplest forms of life are practically immortal; when a microbe-like micrococcus divides, nothing dies, and throughout the whole series of successive divisions, the primitive life is preserved. On the other hand, in the case of higher animals such as man, there

are both mortal somatic cells and reproductive cells which by means of conjugation become practically immortal. The mortality of the somatic cells is evidently an acquisition, an advantage fixed by natural selection; but there exist multicellular organisms evidently derived from creatures which had acquired the division into mortal somatic and immortal reproductive cells, and which have lost it since. All the cells of their body are able to avoid death by conjugation. This occurs in many conjugate algæ like spirogyra and in some of the volvocineæ —*Stephanosphæra, Eudorina.*(5)

Plainly, then, the farther one examines the facts the more enlarged becomes the conception of degenerative evolution. It is not confined to unusual, abnormal, or pathological cases. Degeneration is not an accident in evolution; it is the obverse of progressive evolution, and the necessary complement of every transformation whether anatomical or social.

Whatever transformation may be studied, it will be found that change is always accompanied by an elimination of some parts, and that, in the interests of the organism as a whole, these useless parts gradually degenerate. When a whole organization begins to undergo retrogressive evolution and to decay, it is frequently in the interests of some still larger organization. All progress implies necessary eliminations. In the domain of society, those who are victims, and who from birth, education, or interests attach themselves to the decaying institutions, naturally see only the degenerative side of the change; but those who regard the process as a whole, and do not concentrate their attention upon the injured interests and individual sufferings, will see the other side of the movement.

When a social organism is degenerating, there is considerable opposition to its complete disappearance; and so, as Houzeau has said, it is to be expected that living and superior civilizations drag behind them a trail of débris from dead civilizations.

In like manner, the excesses and arrests in development of the face, nose, jaws, and teeth are brought about and produce all the deformities associated with these parts.

BIBLIOGRAPHY.

1. *Correspondenz-blatt der Deutschen Gesellschaft f. Anthrop.* 1894.

2. KAMPF. "Der Theile im Organismus."

3. KIERNAN, J. G. *Medicine,* 1901.

4. SPITZKA, E. C. "Somatic Etiology of Insanity."

5. DEMOOR. "Evolution by Atrophy."

6. BLAND-SUTTON. "Evolution and Disease."

7. "Therapeutics."

Discussion.

Dr. T. P. HINMAN, Atlanta, Ga. To begin with, I want to propose a motion, that is, that we give to Dr. Talbot a rising vote of thanks for this most excellent paper.

The motion was carried, and the association extended to Dr. Talbot a rising vote of thanks for his paper.

Dr. HINMAN. You cannot expect me to give this paper the discussion that it deserves, because you cannot expect any man to absorb in the short time that this lecture has taken a work of forty years, and I can only say that this paper has a great many problems that have always appeared absolutely unexplainable to me. The series of slides are certainly most wonderful. The fact that the human being has gone through the four stages of fish, reptile, bird, and mammal,

and that arrest of development is simply a reversion to one of these stages, is a new thought to me. I am sure that the lecture of tonight will help me to understand some of the pathological conditions that we find in the human mouth and the human face, which heretofore have been the deepest of mysteries. I have often wondered why it was that in patients of the lower order of intelligence we so frequently find malformations of the arch and teeth. There is just one question that I had hoped to have cleared up tonight, and which I am sure Dr. Talbot can explain, as it concerns cleft palate and hare-lip. I can understand how a reversion to the rabbit will cause hare-lip, but what form of reversion is involved in an arrest of development causing cleft palate? I have thought over this subject to a very great extent, but have never found any satisfactory solution, except that it was an arrest of development, yet in cleft-palate cases there seems to be, to a certain extent, a want of union along the median line, usually to the left of that, and not so much a want of development. This is proved by measuring these malformations of the arch.

It is very noticeable that when a very large number of teeth do not develop in the permanent arch, the canine is nearly always present, and I have heard the statement made that the canine is never absent. Only in the last two months or six weeks have I found a case where the canine is absent and has never erupted, and the X ray does not show that it has ever been present in the lower jaw. I extracted the deciduous canines myself in this patient, a young man of twenty-eight years.

I would also like to ask why, in the eruption of the third molar, where the arch is foreshortened, the third molar, instead of erupting in a vertical line, nearly always erupts anteriorly at an angle of about forty-five degrees. These questions have given me a good deal of thought, and I have possibly found a reason why the third molar does not erupt in a perpendicular or vertical line, and that is, that, as the third molar begins to erupt, it finds the ramus of the jaw very much harder in structure than it does the overlying tissues next to the second molar, therefore, moving in the line of least resistance, it tips forward and grows out at an angle of forty-five degrees.

I cannot fully express my appreciation of this most wonderful lecture, which has given me an infinite amount of knowledge, and I want to thank the essayist most heartily for this very beautiful and instructive paper, which is the culmination of forty years of most meritorious work, that will help to make the profession not a profession of ordinary attainment, but strictly a scientific one.

Dr. L. G. Noel, Nashville, Tenn. I feel entirely inadequate to undertake the discussion of so enormous a work as the essayist has presented to us tonight. I therefore simply want to mention one or two points that I have gathered from this mass of information. I hope that others will follow and give us their ideas on this problem. Dr. Talbot's paper represents a work of forty years, and has necessitated a wonderful amount of labor. No other man in the dental profession has traveled so many miles and spent so much money as has Dr. Talbot in the study of oral deformities and degeneracy generally. He has been all over the world, in nearly all of the prisons and institutions for feeble-minded people, and other such places, taking models of the mouths of

diseased and feeble-minded people and criminals; he has made a most thorough study of the subject which he has presented to us in a most instructive way tonight, and we owe him a great debt of gratitude.

I am sure that many of us have gained valuable ideas from the paper, but it is impossible for us to realize how much we can gain until we have thoroughly studied it. I would suggest that you obtain Dr. Talbot's work on degeneracy, and read the papers which he has mentioned that were presented in the *Dental Cosmos* on the etiology of oral deformities, and as you study them, many applications will be suggested to you. I am sure that your ideas about orthodontia will undergo some changes in the light of what he has put before you this evening. Some of the prominent men in the profession teach us to never under any circumstances extract teeth to correct oral deformities, that we should not remove any of the normal thirty-two teeth. I have never believed in that rule. In my opinion there are many instances in which we must adapt the treatment to the causes that bring about the existing conditions. We also seem to have been at fault all along in the care of children and in the feeding of infants. Considering the essayist's statements as to environment and performance of function, we can clearly see that we have commenced too late in life to feed children on solid food that requires mastication; too much breakfast food has been administered to build up the true function of the jaws and properly develop the bones and muscles. If we give the child, as soon as the first dentition is completed, solid food to eat, we not only prevent caries of the teeth, but by keeping the teeth cleansed by constant mastication and friction, preserve them in the position essential for the proper development of the bones and eruption of the permanent teeth. This would surely oftentime prevent atrophy of the bones of the face as the second dentition goes on.

We certainly owe Dr. Talbot a great debt of gratitude for the work he has done for the profession.

Dr. R. C. Young, Anniston, Ala. I would like to ask one or two questions. In his book on the "Irregularities of the Teeth," Dr. Talbot states that plurality of birth, repeated twins or triplets, is indicative of degeneration. I would like to ask in what sense does that mean degeneracy? I ask this question for the reason that I have in my practice a woman patient who has had twins three times, yet the parents and the children are normal physically, mentally, and morally.

The next question is, if neither the tooth pulp nor the brain tissue have any means of absorption, in other words, no lymphatics, if this statement is true—and the best pathologists say it is—how is it possible that a clot may be resorbed from the brain? I have asked many pathologists this question, and none has given me a reasonable answer. We know that we cannot get rid of a clot in the pulp, but we do get rid of clots in the brain.

Dr. G. V. I. Brown, Milwaukee, Wis. I was hoping that I might have the pleasure of hearing others talk without being brought into the discussion myself.

I think we all agree, as Dr. Hinman and Dr. Noel so nicely expressed it, that we have seen tonight on the screen a great deal more than anyone can digest for a long time. We have food for thought in the facts represented that will give opportunity for much study.

As Dr. Talbot's pictures passed before my eyes, I was endeavoring to make a practical application of the knowledge thus gained of the exceedingly interesting changes that take place in the evolution of developing structures as portrayed upon the screen. It occurred to me that we might perhaps be nearing the rationale of a possible solution of the etiological character of compound follicular odontomata in which there are sometimes many teeth, and particularly those cases in which from time to time operations have been performed and large numbers of teeth removed, that have continued to grow until more teeth have been removed. As you know, it has been reported that one hundred and fifty or more teeth have been taken out of the same individual. If these all developed simultaneously, as we are accustomed to think, it would not be so surprising, but it is difficult to understand how there could be a more or less continuous development of these epithelial structures in adult cases. I believe that Dr. Talbot is nearer a solution of that problem than anyone else who has offered an explanation.

With regard to the imperfect character of the cells in certain malignant growths, the question arises as to whether they are not the result of local irritation of certain cells left from embryonic conditions and which are in imperfect relation to the other structures. The cysts I have referred to have been placed in the class of malignant growths simply because they show this proliferation. Perhaps, after all, it is simply a continuation of the idea of Dr. Talbot that there has been an arrest of development at some of the several periods through which the embryo appears to pass that has resulted in the growth of such a large number of teeth.

There are almost unlimited possibilities for the application of the great principle which has been so ably presented. I am glad to add my own expression of pleasure to that which has been given; and of course, having known Dr. Talbot so long, it is a matter of personal gratification to me not only to have heard his address, but to witness the reception accorded to him, and the enthusiasm with which the members have entered into the discussion of the paper.

Dr. Talbot (closing the discussion). I thank you very much for your kind attention and applause. I will commence at the end of the discussion, and answer Dr. Brown's question first. My idea, as Dr. Brown suggested in regard to the development of the dentigerous cysts, is that they are nothing more or less than a collection of epithelial cells trying to develop an extra number of teeth. In some such cases any number, from seventy-five to one hundred and seventy-four teeth, has been developed.

In regard to the point raised by one of the speakers as to ability of the pulp to repair itself, I am reminded of a microscopic picture I published in the *Dental Cosmos* some twelve years ago, which to me was one of the most important pathologic conditions I ever discovered. It was a case of three abscesses in a dental pulp, one just forming, one fully developed, and one entirely healed.

How does my friend know there are no lymphatics in the dental pulp?

Dr. Young. Only from what I have read.

Dr. Talbot. I have shown any number of microscopic slides of the dental pulp, but whether there are lymphatics or not I do not know, and no one has ever been able to say whether there are or not. The fact, however, that this abscess had

formed and healed, showing cicatricial tissue, leads me to believe that the dental pulp can repair itself in some way or other. The poisons may be carried out by the veins, but whether this be true or not I do not know. Truman, a few years ago, made some investigations along this line, and he found that in staining a freshened pulp, in the course of a week the coloring matter was found in the lymphatics of the neck. If that be true, there must be some way of getting rid of the poisons in the pulp.

There is no subject that we as a profession can study and enjoy so much as the pathology of the dental pulp. I have been making studies along this line of work for several years, and have been able to find some fifteen or twenty different diseases of the dental pulp. It is interesting to note that we can study these diseases more readily in this tissue than in any other, since they may be formed as the result of autointoxication.

In regard to the development of the third molar, all these cases may be accounted for by way of reasoning as an arrest in development in ontogeny. The cleft palate is the result of an unstable nervous system, and is an arrest in phylogeny.

As to the canine, I cannot remember a case where it did not develop, but if you have had such a case, it must represent a type of degeneration. That is to say, there was an unstable nervous condition unusually marked at the time that affected that particular germ.

Motion was made and carried to adjourn until the morning session at 9 o'clock on Wednesday.

SECOND DAY—Wednesday, April 5th.

THE meeting was called to order on Wednesday morning, April 5th, at 9.30 o'clock, by the president, Dr. Hassell.

The President appointed the following as the Committee on Necrology: Dr. R. B. Bogle, Dr. Wm. Crenshaw, and Dr. L. P. Dotterer.

The Executive Committee, through its secretary, Dr. COTTRELL, reported that the committee has been called upon to appropriate $150.00 toward the banquet to be given on Friday night, as the Banquet Committee had failed to receive from the members the necessary amount to defray the expenses of the banquet. The committee recommended that the association appropriate the amount specified, and also recommended that the resolution providing for an annual banquet be rescinded.

Dr. FINLEY moved that the society appropriate $150.00 or as much as was necessary to cover the present situation, to the banquet. Motion carried.

Dr. GORMAN moved that the present resolution with regard to the annual banquet be amended to the effect that the banquet be given on the subscription plan, and without expense to the society. Motion carried.

The next order of business as announced by the President was the reading of a paper by Dr. R. C. YOUNG, Anniston, Ala., entitled "Some Suggestions to Those Who Lecture to the Public on Oral Hygiene," as follows:

Some Suggestions to Those Who Lecture to the Public on Oral Hygiene.

By R. C. YOUNG, D.D.S., Anniston, Ala.

THOSE who read the current dental literature of the day must be impressed with the worldwide awakening to the vast importance of oral hygiene, the care and preservation of the teeth. I would that we as a profession were more competent to go a little farther. Anatomists tell us that the mouth begins with the lips, and ends with the posterior wall of the pharynx. If we accept this boundary as our rightful field of labor, then we are not giving the public all the help we should. for in no talk that I have heard or article I have read from those appointed to teach the public has there been one word about any other organ of the oral cavity than the teeth. But as we are dentists and not stomatologists, I suppose we must confine ourselves to the teeth, and perhaps, after all, it might be better for us to seek a union with the trades federation than take a place in the halls of the international medical congress which has been recently in session at The Hague.

That clean teeth do not decay is not a

theory, but a fact which has been recognized and accepted from time immemorial. We find prescriptions for dentifrices and mouth-washes in the time when Egypt wrote her history in hieroglyphics, long before Moses taught his people that cleanliness is akin to godliness. (See "History of Dentistry," by Dr. Vincenzo Guerini.)

Just what constitutes clean teeth seems to be a little doubtful, for in the discussion of a brilliant essay by Dr. Bogue, published in February 1911 *Cosmos,* stating that clean teeth do not decay, we find the statement of an equally brilliant man, Dr. Guilford, that—"This is a serious error; it is impossible to keep the teeth actually clean;" that for eight hours or nine hours out of the twenty-four, during sleep, there are vitiated secretions working great harm. There's the rub! Why are we not able to correct these abnormal secretions? We all know, but we lack the moral courage to say. The Virginians know, and have said why it is.

CARE OF THE TOOTH-BRUSH.

Perhaps the best means of keeping the teeth clean is the tooth-brush. I believe that one can become so expert in its use that the quill toothpick, floss, or rubber bands can almost be dispensed with, though they are to be highly recommended and insisted on, for few are experts. We find the tooth-brush a very ancient article of the toilet. Fauchard speaks of it, and advises the use of a small sponge instead. Inasmuch as these brushes were then made of horsehair, the sponge was no doubt more effective. I believe we are indebted to the belles of Paris for the brush as it is; it was introduced by a ship captain to this country, he having brought some to his daughters nearly a century ago. As a rule, the care of the tooth-brush receives but little attention. When we realize that a tooth-brush is nothing more than a scrubbing brush, and that we use it to scrub a cavity full of germs, partly decomposed particles of food, inspissated mucus, etc., it is readily seen that it should receive extra care, for it is more filthy than the brush and mop used on our floors by the scrub woman. The tidy housewife has these sunned and dried. The tooth-brush is used, left wet on the washstand, sometimes dropped in a brush-holder along with a nail-brush, shaving-brush, etc., or perhaps hung upon the wall. Usually the lavatory or washstand is located in a dark part of the house or corner of the bedchamber, where no sun ever reaches, or where ventilation is poor. What is the inevitable result? The brush should at least be dried and when possible fully exposed to the sun. If this cannot be done, it should be placed near an open fire or upon the radiator, and allowed to remain until the bristles are perfectly dry and regain their elasticity. No brush should be used after the bristles begin to fall out. How many times have we found stray bristles insinuating themselves deeply down in the gum tissue, causing a surprising amount of irritation in comparison with their size, owing to their poisonous condition. Should they get into the stomach or intestines, the result might be fatal, as ulcers or even perforation could possibly be caused. Recently I had a lad of about twelve years present for examination of the throat. I found a tooth-brush bristle embedded over two-thirds its length in the tissue of the tonsil, causing great pain every time the patient swallowed. Had this bristle slipped through the glottis, it would surely have resulted in pneumonia or abscess of the lung. A 30 per cent. solution of alcohol makes a

most excellent detergent and germicide for the tooth-brush. This solution can be colored with some coloring water or flavored with some of the essential oils, according to taste. It is very effective, yet harmless, should a child happen to get hold of it.

EFFECT OF ACID ON THE TEETH.

Without the presence of acid in the mouth there can be no dental caries. It matters not how it gets there, whether it be due to abnormal secretions, fermentation, gelatinous plaque, as pointed out by Leon Williams, or whether it be directly introduced in foods or drugs, its presence is absolutely necessary to caries. If this is correct, then an antacid wash or dentifrice must be more active in preventing decay than a germicidal wash.

The teeth that are being passed around [specimens were passed] have been macerated in a solution of lactic acid. It can be noted that the calcium salts have been leached out, leaving only the animal matrix. This is a very exaggerated condition, but I find it a valuable means of illustrating the effects of acids upon the teeth in my talks in public and at my chair. I have used lactic acid for several reasons: First, it is generally found about the mouth, and is associated with fermentation of sugar and other substances in presence of albuminoid substances. (See Leber and Rottenstein.) Lactic acid is almost insatiable in its greed for calcium. Any other acid, however, will answer, either mineral or vegetable. What remains of the tooth, you see, cuts like wax. If the soft dentin is removed from the cavity of a carious tooth, it will be found to have a strong acid reaction. Upon testing the oral secretions of patients, a large number will be found to show an acid reaction. I will pass around this litmus paper. Try it, and see how many mouths give an acid reaction. The paper turns red. Dogs never suffer from toothache, though they do from pyorrhea. I have never found their saliva acid. I have here [demonstrating] some cheap candy from the so-called "poor man's friend." On cutting off and mixing a piece with a little water, we find the solution to be very acid, though it tastes sweet. This is a piece of high-priced candy [demonstrating], the kind you buy for your sweethearts and wives. This too is found to be acid. This is a lump of cut sugar [demonstrating]. It shows no reaction, in spite of the fact that Dr. Roessler tells us sugar is nothing but concentrated crystallized acid. This is a little cane syrup [demonstrating], the kind our farmers' families are brought up on. It is sweet to the taste, but quite acid to the test. "No sweet but has its acid." I find that a number of drinks served at the soda fountains give a strongly acid reaction; and so we find a great number of other articles commonly used in our daily *régime* giving a strong acid reaction.

DENTIFRICES AND THEIR MERITS. LIME-WATER ADVOCATED.

As to dental toilet preparations, it is a daily question, what is a good mouth-wash. We all have been using listerine, dioxogen, borolyptol, or some other of the numerous commercial preparations. Let us test some of them! We find that to the litmus test all show red. The pastes and powders we find to be neutral.

In all sincerity, how can we hope to keep the teeth clean and prevent caries if we do not correct this never-ending acidity? More than a quarter of a century ago, Dr. Walker of New Orleans advocated the use of lime-water, not only locally but systemically, and many were

the battles royal fought on this subject, some claiming that unless the calcium salts went through nature's laboratory they could not be assimilated. If this be true, how can it be explained that the lithium preparations are solvents for uric acid? They must be assimilated. About two years ago, I was fortunate enough to be the guest of the Atlanta Dental Association at a banquet given in honor of Dr. Edmund Kells of New Orleans, when he read a valuable paper on the use of lime-water as a prophylactic mouth-wash. So thoroughly were all those present convinced of the great value of this simple preparation that the Atlanta Dental Association had instructions printed on the making and use of lime-water, as suggested by Dr. Kells, and used in his practice. At the last meeting of the Alabama Dental Association similar action was taken, and the secretary was instructed to have several thousand circulars printed, to be sent to the members of the association for distribution among their patients.

If every man who lectures to the public on the care of the teeth, if every dentist at his chair will give this simple little demonstration, he will be surprised how soon his efforts will bear fruit. Recently, a few days after giving a lecture to the teachers of the public schools of Calhoun county, Ala., a lady told me that she overheard her little daughter telling a younger sister that she must brush her teeth; that, if her teeth were decayed, she dragged her food through a mouth dirtier than the gutter of the street. I had told the teachers pretty much the same, and they told the school children. I have succeeded in having gallons of lime-water used among my patients. Most of them use it faithfully. I tell them the more often they use it the better. There are, of course, other preparations that can be used—milk of magnesia, glyco-thymolin, or sodium bicarbonate. The first two will be found quite expensive if used in sufficient quantities; the last is effective but not so pleasant.

A FEW FINAL HINTS.

And now, go forth and preach the gospel of clean teeth; how acids cause their disintegration, how, by the continual and diligent use of antacid mouth-washes, this disintegration can at least be held in check! Tell them of the grave danger of hypertrophied tonsils and adenoids, how they are the open door to disease, how they rob the child of its God-given inheritance—a healthy mind and body! Familiarize yourselves with the conditions so as to be able to present them plainly before the public! Couch your instruction in plain words, avoid technicalities!

Discussion.

Dr. L. D. CARPENTER, Atlanta, Ga. I wish to say a few words. I have been practicing dentistry in Georgia since 1858.

I have a record in my books showing that in the month of April 1865, during the civil war, I did one million dollars' worth of work in Confederate money value:

Record of dental work done in Georgia in war-time (month of April 1865). Confederate money, $1000.00 = $1.00 gold.

	Gold value.	Confederate.
40 gold fillings.....	$120.00	$120,000.00
1 full gold denture..	500.00	500,000.00
1 full rubber denture	225.00	225,000.00
60 teeth extracted ...	60.00	60,000.00
Sundry services		95,000.00
Total		$1,000,000.00

A few other disbursements of that time may be interesting:

	Gold value.	Confederate.
1 spool of cotton thread	$0.02	$5.00
1 paper of pins	0.02	5.00
1 yard of calico	0.05	125.00
1 pair of shoes	2.00	450.00
1 suit of clothes	50.00	2500.00
1 cigar	0.05	5.00

Dr. F. A. Johnston, Ala. Dr. Young has suggested to us many valuable thoughts. There is one point on which I would like to be set right, namely, in regard to the acids taken into the mouth. If I remember correctly Dr. Black claims, and I understand his claim has been confirmed by Dr. Miller, that any acid in the mouth, while it may be sufficient to produce erosion, if it is to produce caries must be formed at the point where the caries occurs.

Dr. Young is always giving us a thrashing for never seeing anything but the teeth in the mouth, and we may deserve some censure. In talking to school children I never fail to try to impress them with the fact that dentistry in the broad sense means more than the teeth, and that disorders of the nose, throat, adenoids, enlarged tonsils, etc., should receive the attention of the dentist, especially as we are in a position to see and know the importance of these disorders and the amount of harm they do to school pupils. The attention of the parents should be called to the importance of having these disorders looked after by a specialist. I trust that every man who is lecturing in the public schools—and I am glad to say that in Alabama we have done a great deal in this respect in the last two years—will profit by Dr. Young's remarks.

His suggestion on tooth-brush bristles becoming embedded in the tonsils, etc., is well made. Sometimes I think we are inclined to exaggerate the danger from bacteria, for we are surrounded by them all the time—they are always present in the mouth. After a while there will be a reaction in that respect. If patients brush their teeth carefully every day, although the brush receives no more attention than the rinsing-off after use, it should not become a very poisonous weapon, provided the cavities in the mouth have been filled as they should. While I do not want to take issue on that point, I would suggest that we can go too far in that direction and scare some of our patients, and that, after a while, there may be a reaction that will do our cause harm.

Dr. S. P. Sharp, Knoxville, Tenn. In some of the worst cases of diseased teeth I find the saliva to react strictly alkaline, especially in cases where the gums are badly diseased, and I would like to know how to correct that condition. I think that the more nearly neutral the fluids of the mouth are, the better.

Dr. R. H. Jones, Winston-Salem, N. C. Dr. Young's paper contains several statements that I can substantiate to a certain extent. One of the oldest and best practitioners of our town, Dr. J. W. Hunter, called my attention to the fact that the use of sorghum is very bad for the teeth. Several times he called me to look at mouths affected by its use, and said that by a glance at the teeth he could almost invariably tell when patients had used a great deal of it. That bears out the essayist's statement in regard to acid and its effect on the teeth.

His illustrations and his practical demonstrations of the effect of the different mouth-washes, if we make correct practical use of them, will bear fruit. I have believed for a long while that a good many of these preparations are bad, but I am glad to hear him confirm my

opinion of glyco-thymolin, which I think one of the best preparations we have.

Dr. H. H. JOHNSON, Macon, Ga. I do not care to take the time of the society just now in discussing this question, because these subjects will be treated in the report of the Committee on Oral Hygiene. There are one or two points that I would like to bring out, however, in connection with the paper. First in regard to tooth-brushes: In my opinion, we are improving in that respect. To the best of my knowledge I believe that the people are becoming educated by the dentists' continual censure; but the druggists are our worst enemies. Patients present whom I have every reason to believe have attempted to take care of their teeth. I ask them if they brush their teeth regularly, and they say they do, but, when I carry the investigation further, I find that they have been using some very large tooth-brush with square-cut bristles, with which it would be absolutely impossible for the most expert person in the world to clean teeth. If we were to become energetic in this matter, instead of telling patients to buy a tooth-brush we should send a prescription, and instruct them to get the brush specified; then, if the druggist attempts to substitute another on which he makes a larger profit, have the patient decline to take it. The druggists have show-cases full of brushes that are not used or recommended, and yet they sell them to our patients, who are damaged thereby to a remarkable extent.

In regard to proprietary preparations and Dr. Young's experiments, I would like to have Dr. Young enlighten me on two or three points. Does he know what acid causes the reaction in borolyptol and the other preparations he mentioned? Will he kindly tell us what acids act most dangerously upon the teeth, and whether these preparations give that kind of acid reaction? Is it not, after all, a rather harmless acid, if we may term an acid as such, that imparts to these preparations an acid reaction? I think very weak solutions of boric acid are generally used. I have made such tests in the past, and I find that many of the acids, with the exception of hydrochloric, acetic, and lactic acid, affect the teeth very little, even when the teeth are immersed for hours in solutions of considerable strength. I am therefore inclined to believe that while all acids are to be considered injurious to the teeth, probably this point has been over-stressed, as those acids which give the weak reaction are merely added to impart stability to the mixture.

Dr. F. C. WILSON, Savannah, Ga. I have been deeply interested in the paper. I have tried in the last few years to devote a great deal of study to oral prophylaxis. The point which Dr. Johnson made about tooth-brushes is very pertinent. He says that we should give a prescription to the druggist. That is a very good suggestion, but it does not go far enough yet. In my own practice I send to the druggist and select for each patient the kind of brush that I wish him to use. I brush his teeth with it, then make him take it in his own hand and brush his teeth. The awkwardness which the patients will exhibit in this brushing, and the gyrations they will go through in trying to go over their mouth, are appalling. In trying to brush the teeth on the inside, they usually throw the brush out with the tongue. It is very evident, then, why the teeth are so poorly cared for, and I have often said to my patients that if there were any one thing in the world that I would change the name of, it is

the tooth-brush, because every child takes the brush in his hands, wets the end, passes it over the teeth and puts it down, thinking he has brushed his teeth, simply because it is a tooth-brush. I teach my patients that it is just as necessary to brush the gums as the teeth, and that the brush is no longer a tooth-brush, but a gum-brush, and that I want it to be known by that name ever after.

Dr. L. G. Noel, Nashville, Tenn. Dr. Young should be commended for the work he has done in presenting this paper. It is very interesting to me to know that so many of the preparations mentioned are acid, and yet I am inclined to think that the essayist overestimates the damage done by these acids. Dr. Johnson sounded the keynote of this question, which has been worked out long ago by Magitot, who has worked over the acid question for a great many years. He believed that caries was produced by acids in the mouth, and by a number of experiments he produced something that resembled true caries. It remained for Miller, however, to show the fallacy of his conclusions. The softened teeth that have been passed around do not show true caries as we find it; if we examine them under the microscope, we will find that the tubuli are not broken down by micro-organisms, that they do not show true caries. If the saliva is examined at almost any time when we are inactive, it will be found that it will redden litmus paper. On the other hand, during our working hours, the salivary glands are active, and probably no acidity will be found, but a slight alkalinity due to the cyanids of potassium and sodium active at that time. Caries is not produced by all these various acids, but by lactic acid, and it has been conclusively shown by Miller that this occurs only when the acid is nascent and is held in contact with the teeth by bacterial plaques, and that caries cannot be produced in any other way. Free acids are of but little potency in the production of caries. I am not at all inclined to overturn all the work of Miller, Black, and others, and Dr. Young is perhaps wrong when he says that these acids produce caries of the teeth.

As to the question of the action of sugar taken into the mouth, we know that it is converted into glucose and lactose in a very few minutes by the action of the ptyalin of the saliva. Cooked starch in one minute's time is converted into a fermentable form of sugar by the action of the ptyalin of the saliva, and in my opinion it makes little difference in what form the sugar enters the mouth. Probably no more harm is done by sorghum than by pure cane sugar.

In the presence of quantities of sugar in the mouth, the micro-organisms have the power of fastening themselves to the surfaces of the teeth and, when abundant, these organisms produce much acid, for sugar is their natural food. We should go back to real scientific facts, and look at this question in the right light.

I think the essayist has rather forgotten some of the teachings of such men as Dr. Wassall of Chicago, who read a paper on the brushing of the gums, gargling of the throat, and thorough irrigation of the mouth. My late friend, Dr. Crawford, was constantly preaching in this society the importance of irrigating the mouth, of washing back and forth, and he used to tell us on this floor that hardly anybody in the profession knew how to wash the mouth, and he would take a glass of water and show how it should be done.

Dr. R. B. Adair, Atlanta, Ga. I have

always been a crank on oral prophylaxis, and have always thought that it should be taught in our colleges. Not long ago I said that if I were a member of the state board of dental examiners, one of the first questions I would ask would be, "Can you clean your own mouth?" If the student answered in the affirmative, I should ask him to let me see him do it, and if he failed, I should not grant him a license. If a dentist cannot clean his own teeth, he cannot teach his patients to clean theirs. Therefore I believe that this subject should be taught separately in the schools. I always make it a rule never to allow a patient to leave the office without giving him instructions on these lines. I keep tooth-brushes in the office for that purpose, and frequently brush my own teeth to give them an actual demonstration. I believe this is the greatest service a dentist can render to his patients, viz, teaching them how to cleanse their teeth. We all recognize the fact that clean teeth are less liable to caries, and where the teeth are clean there will be no pyorrhea. A perfectly sanitary mouth means almost immunity to all diseases. The mouth offers a port of entry to nearly all diseases, and if it be unsanitary it is a veritable hotbed for the propagation of disease germs.

I have often thought that the next time this question was brought up before a society, I would call for a tooth-brush drill; it would be a good idea to see how many dentists can actually clean their own teeth scientifically and properly. I have seen dentists who had such unhygienic mouths that I would not sit in their chairs for five minutes. The dentist, for his own comfort and protection, should be interested in oral hygiene, which I consider the most important part of the practice of dentistry. We should teach our patients oral hygiene if we would fulfil our duty. There is not a patient who leaves my office without some knowledge of oral hygiene, whether he pays for it or not. I tell the patients that this is the most valuable service I render, that it takes time, and that I am going to charge for it. I have a set of continuous-gum teeth that I made years ago, which I use for demonstrating, and find it most valuable. I recommend the Prophylactic tooth-brush, because it is the best I can find, and I prefer one with the softest bristles. With the artificial denture and that brush I give my patients a demonstration outside of the mouth; then one in their mouth, and tell them to brush their teeth to ascertain if they can do it, and only about one out of a thousand can do it. Yet these patients, when asked if they brush their teeth, will say, "Yes, I brush them three or four times a day."

I will illustrate my remarks by relating a little incident that occurred a few years ago. I was treating a prominent lawyer for pyorrhea. My rule, when dismissing patients who have been treated for pyorrhea, is to have them thoroughly trained in oral hygiene, so that they can clean their teeth, and will continue in prophylactic habits. After two or three days this patient came back with his teeth covered with tartar. I expressed my surprise at the condition of his mouth, for when he left his teeth were cleaned thoroughly. He said he had been doing as I told him, and my reply was: "You are governed in law by evidence, and we are governed in dentistry by evidence. The evidence in this case is that you have not carried out instructions, and your teeth are not clean." He then acknowledged that he had not followed instructions. I took a scaler and flaked

off some of the tartar and showed it to him.

Dr. PATTERSON. You did not expect him to get that off with a camel's-hair brush?

Dr. ADAIR. No, I did not say a camel's-hair brush. I treated this man for pyorrhea, and today he has a most beautiful set of teeth, and is very proud of it. The most important point is to give the patients an ocular demonstration outside of the mouth with an artificial set of teeth, and then one in the mouth, and show the method of brushing. It takes three or four days to get them trained in this work. Clean teeth mean no pyorrhea, and clean teeth mean comparative immunity to disease, because nearly all infectious diseases come through the mouth.

Dr. H. W. WALKER, Macon, Ga. I want to ask Dr. Young if he considers dioxogen injurious? I use it quite extensively in my practice, and about a year ago I tested it and found that it was decidedly acid, but recently I made another investigation and found that it showed very little if any acid reaction.

Dr. YOUNG (closing the discussion). There have been so many questions asked that it will be impossible to answer them all. Beginning at the end, I got my ideas regarding dioxogen from Dr. Cryer's writings, whom we all consider an authority.

Dr. Noel refers to Miller's teachings on the subject of caries. Miller says that there can be no caries without acid, and that lactic acid is the most active acid. I am perfectly familiar with Miller's investigations, but I told you that this was an exaggerated demonstration, something to show to patients.

If I am not mistaken the text-books teach us that all acids have an affinity for calcium. Stellwagen years ago taught us about the chemico-vital decomposition of the teeth, which is caries. The lactic-acid bacteria produce an agent which leaches out the calcium salts, and changes the albuminous matter into a pabulum suitable for them. I know that the saliva is sometimes alkaline. One gentleman has asked how to correct the ropy saliva that we are all familiar with. It must be done by treating the lower part of the abdominal cavity, and cleaning out and stimulating the secretions and the circulation in the bowels, the kidneys, and the liver. When these organs are stimulated to healthy activity, a healthy mouth will result.

When I look into the future of dentistry and see the splendid opportunities for benefiting mankind, I would advise young men to study dentistry.

My position in this matter is to teach my patients that acid causes caries, acid plus something else. I did not pass those specimens around as specimens showing caries. Miller, with Leber and Rottenstein, says that acid must be present, plus something else. The black decay in teeth they ascribe to the presence of sulfuric acid, and the chalk-like, so-called white decay they consider as the result of hydrochloric acid. Another condition where rings of decay are noted around the necks of the teeth, invariably associated with gingivitis, is due to an excretion of lactic acid. The theory that bacteria are the only cause of decay is absurd.

We are very often asked by patients why they have deposits of tartar on their teeth. I tell them that we have two sets of glands, the parotid glands, the secretions from which are always acid; they cannot hold calcium salts in solution unless they are acid. I tell them that we have two more glands, the submaxillary

glands, the secretions from which are neutral; when the acid secretions combine with the neutral or antacid ones, the mixture becomes neutral and precipitates calcium salts, which is tartar; that will start gingivitis.

Army Dental Legislation.

At this point the President gave the floor to Dr. Wm. Crenshaw, Atlanta, Ga., chairman of the N. D. A. Committee on Legislation, who spoke in regard to the present status of army dental legislation, as follows:

The Legislative Committee of the National Association wishes to put the status of its work, as it now stands, before this body. We wish first to have introduced here a resolution with reference to the work done for us by Senator Overman of North Carolina, for several years past. I will ask Dr. V. E. Turner to read the resolution.

Dr. V. E. Turner, Raleigh, N. C. I have known Senator Overman for twenty-five years. In our state legislature he has been very active in influencing the passage of the dental law in North Carolina, and has given great evidence of his interest in the cause, recognizing that it was necessary for our protection and elevation. When he went to Washington as senator, I wrote to Dr. Donnally of the Legislative Committee that I thought he would find in Senator Overman a warm supporter of the army legislation, and the senator has indeed taken an active interest in, and has watched the progress of this legislation constantly, and has worked industriously at all times to help the dental profession. I therefore wish that this resolution be passed:

Whereas, while the dental profession is indebted to many men in public life for their support of proposed legislation, it is directly due to the special, timely, and eminently essential personal effort and influence of the Hon. Lee S. Overman, a United States Senator from the state of North Carolina and a leading minority member of the Senate Military Affairs Committee, that there was recently enacted by Congress a measure which materially increases the number and improves the professional, social, and official status of the army dental corps; therefore be it

Resolved, That it is the sense of the Southern Branch of the National Dental Association that the dental profession of America should hold in high appreciation and grateful remembrance the service rendered by Senator Lee S. Overman in behalf of the health, comfort, and efficiency of the commissioned and enlisted *personnel* of the army, and also in behalf of the claims of the dental profession for a more just and suitable recognition on the part of the national government, which claims have commanded the hearty sympathy and active interest of Senator Overman during the entire period of his public career.

The motion was carried.

Dr. Crenshaw. I wish to make a statement with reference to this legislation work, and will also ask Dr. Donnally to give his views. Dr. Donnally is in Washington, in close touch with congressmen, and knows more about the status of affairs than all of us combined.

We introduced in the latter part of the sixty-first Congress a bill (as an amendment to the army appropriations bill) embodying the old Pettus bill, presented by Senator Bulkeley, which carried with it three grades. This amendment I am positively sure would have succeeded in getting through Congress, and we would have had a commissioned dental corps in the army with the three grades of lieutenant, captain, and major, had it not been for the interference of the War department in the conference committee. The two higher grades were struck out, so that we have a law which gives rank,

but no higher grade than lieutenant, and perhaps lieutenant unmounted. But the bill puts the army dentists on a commissioned basis; we have secured that much. We are, however, not satisfied with the bill, and if we are to get what we want, the profession must give more material help to the Legislative Committee. Hereafter, when the Legislative Committee writes or telegraphs you, we ask you at once to get to work on congressmen and senators in the way the committee suggests. The committee cannot do more than any other small number of men, and unless you are all active and act as one man, we are not going to have the recognition that the profession asks and is entitled to. The government is slowly finding out that it will never get the efficiency it needs in the dental corps until it gives adequate recognition to our profession, and until it puts a premium on our services such as is placed on the medical service.

Dr. WILLIAMS DONNALLY, Washington, D. C. I am very sorry the time is so limited, as I consider this subject worthy of very much more attention than can be given to it in twenty minutes.

When I heard Dr. Turner speak of the work of Senator Overman, I could but think of the fact that his representative in Congress, Senator Overman, is but a reflection of his dentist at home. The same may be said of each of you, gentlemen, for as you are, so will your representative be. Senator Overman is a modest man and does not seek any recognition for his work in this line, but I think that this resolution is very just and proper on our part. We would be lacking in appreciation if we failed to offer to him our sincere thanks for the result he has obtained for the profession; and we should just as sincerely appreciate what he attempted to accomplish, and what he would have accomplished to the honor and credit of the profession if circumstances had not interfered over which he had no control at the time, and of which he was not informed. The effect of the opposition to which I refer was that two of the three grades of rank for which the dental profession has contended for nine years were omitted, and thus our measure, enacted several times by the Senate and approved by the House Military Committee, was reduced to a one-grade army dental corps. This was done in the secrecy of the conference committee through the extraordinary efforts of the War department, not only officially through the secretary, the chief of staff, and the surgeon-general, but by such means as a lobby of commissioned officers in citizens' clothes buttonholing members of Congress at the Capitol, and asking them not to give dentists any rank at all. Medical men tried to defeat this legislation, and a remark of a former medical officer, now the chief of staff of the army, was substantially, that the more dentists we have, the fewer surgeons we will have in the army, and therefore he would not do for army dentists as he had previously indicated he would.

As to the navy dental legislation that has been pending in Congress for a number of years, we have different conditions to deal with. We have the Surgeon-general and all the other bureau chiefs who have anything to do with recommending this legislation, fully committed, and all willingly agreed that three grades of regular rank is the minimum with which the navy dental corps should be started in the service, and we have their promise that they will continue to advocate that measure, notwithstanding the efforts of certain of the War department officials

to get the Navy department to reduce the navy dental bill to a one-grade bill.

There is no official more dependable than Surgeon-general Stokes of the navy. The chairman of the Senate committee told me a day or two before I left him that he would renew the effort to pass the bill at this special session of Congress. This should be done even though the House of Representatives should defer action until the next regular session.

I wish to urge the members of this society to give their hearty support to the Legislative Committee of the National Association, in order that we may secure the larger measure of recognition that we deserve and are entitled to and should have received in the recent army dental act. There are no personal questions or interests involved in the navy legislation, and none should be permitted to affect the higher rights and more important interests of the profession. The Legislative Committee needs and deserves your hearty and loyal co-operation. This is of importance to the profession, otherwise army medical officers would not contend so strongly and in such various ways to compass its defeat.

The next item on the program was the reading of a paper by Dr. N. A. TEAGUE, entitled "Some Phases of Dental Chemistry," as follows:

Some Phases of Dental Chemistry.

By N. A. TEAGUE, D.D.S., Augusta, Ga.

WITHOUT attempting to enlighten and to risk tiring you with the historical phase of this subject by giving a *résumé* of its development as a science from the time of the alchemists to its present position of advancement as one of the exact sciences, or possibly wearying you with fundamental data respecting its nomenclature and laws of combination of atoms, weights, gaseous combination by volume, or its determination of molecular and atomic weight, density, etc., let me briefly trace the importance of a recognition of certain chemical laws, and their application in the comprehension and study of the oral cavity.

IMPORTANCE OF CHEMISTRY TO DENTISTS.

The mouth has been likened to a chemical laboratory fraught with material and conditions for innumerable and varied chemical reactions. Chemistry is the most important, and yet, by the profession at large, by the vast majority of dental practitioners, the least understood of all the arts and sciences allied to dentistry. In presenting this paper it is my desire to arouse an interest among the profession for a more intimate knowledge of the fixed laws of chemical science in their application to dental practice. Chemistry offers greater assistance to dentistry than to any other profession. It is true that the average practitioner and student of dentistry knows as much of Sanskrit as of chemistry and chemical laws and phenomena, and not until he takes up the study of the latter in its application to dentistry, pursuing it with the thoroughness devoted to other branches of study, will he possess a comprehensive intelligence of his environment and the conditions he is supposed

to treat that will entitle him to scientific recognition as a dental chemist.

The seeming disregard for this particular study among the profession, and more especially among students, is accounted for easily when we consider that comparatively few among us are imbued with the spirit of investigation of the hidden secrets of nature characteristic of the student of chemistry. Observation convinces me of the fact that to the average dental practitioner chemistry is a sealed book, an impenetrable, unexplored forest, a mass of incomprehensible equations.

Granting that there is much in chemistry incomprehensible to the average mind, still it is the pursuit of that which will bring enlightenment and mark progress chemico-dentally. "The men who hear the inaudible, who see the invisible, who think the unthinkable, and believe the incredible, are the men who do the impossible."

SOME CHEMICAL PHENOMENA IN EVERY-DAY DENTAL PRACTICE.

Acids in the saliva. Primarily, we should understand the principles of chemical action, so that we may know and recognize its phenomena and its results upon tooth structure. The decomposition of amylaceous and saccharin substances, producing lactic acid, is known to be a potent factor in caries, and is present frequently in acid conditions of the secretions of the mouth. The recognition of an acid condition is easily accomplished, but determination of its character and knowledge of the result of its contact with a neutralizing agent is quite another thing.

The greatest mechanical ingenuity, the skilful construction of fillings, the highest prosthetic art in porcelain and gold would not prepare us to treat intelligently an acid condition of the saliva.

Chlorin and hydrogen in bleaching teeth. The bleaching of teeth is a chemical operation involving chemical laws of repulsion and attraction of atoms; to comprehend it, a knowledge of the chemical action of the agents used is imperative. To effect this change an agent frequently used is chlorin, whose affinity for hydrogen would lead us to believe that hydrogen would be most likely to be given up by the coloring matter producing HCl, the symbol for hydrochloric acid.

"In this chemical phenomenon, the chlorin first acts by seizing upon the hydrogen of a molecule of water by combining to form HCl. The oxygen thus liberated in the nascent state attacks the coloring matter and destroys it." A mixture of chlorin and hydrogen may be kept indefinitely, at ordinary temperature, in the dark, without union taking place; when the mixture is exposed to diffused sunlight, the combination takes place gradually.

Exposed to the direct rays of sunlight or strong artificial light, the combination occurs instantly with explosion. The following equation shows chemically the change that takes place when a solution of Cl in H_2O is exposed to light as in the bleaching of a tooth: $H_2O + 2Cl = 2HCl + O$.

Under the influence of light Cl decomposes H_2O with the formation of HCl, while O is liberated. It acts in the experiment dentally as a bleaching, decolorizing, and disinfecting agent; indirectly as a powerful oxidizing agent, decomposing the H_2O present according to the above equation, and the oxygen, being in the nascent state, acts energetically.

When oxygen is liberated from a compound it is set free first as individual

atoms; these, however, not being capable of existing free, unite in pairs to form molecules, but if at the instant of liberation there be present any substance with which it has any great tendency to combine, as in the coloring matter of a dead tooth, its atoms combine with them rather than with each other.

CHEMICAL VS. PHYSICAL CHANGE.

Chemistry has been well defined as—"That branch of physical science which treats of the atomic composition, and of those changes in matter which result from an alteration in the kind, the number, or the relative position of the atoms which compose the molecule." "Chemistry concerns itself solely with the molecule composition, how its constituent parts are related to each other in kind, number, and relative position." "All chemical changes in matter affect its composition by affecting the character of the molecules, differing in this manner from physics, which deals with the relations of molecules and masses of matter." For example, a piece of ice, when heated, is converted into water and then into steam, and when the heat is withdrawn, the reverse of these changes takes place, resulting in the re-formation of ice. All such changes as these are of a temporary character, and do not affect the essential nature of the material in which they occur; they are referred to as physical changes, and take place as a result of changes in the relationship of the molecules of a substance. In other cases, heat causes a different kind of change to take place in matter. "Chlorate of potassium, when heated in a test tube, is completely destroyed, so that two new bodies make their appearance, one of which is a gas and the other a solid, each different from the original substance and remaining different when cooled." This permanent change, affecting the essential nature as well as the properties of matter, occurs as the result of chemical action. The effects of heat upon potassium chlorate give rise to that kind of chemical action that results in decomposition. "Chemical action also takes place when we mix finely powdered iron and sulfur and then heat the mixture; the action here is so violent that heat and light are given off, and when it is over, the resulting mass is found to be a new substance differing from both iron and sulfur in its properties. This new substance, formed by the union of iron and sulfur, is called iron sulfid, and the unaided senses give us no evidence whatever that it contains either iron or sulfur." It is thus seen that chemical action results in the combination of substances and the formation of new bodies as well as in their decomposition.

For these reasons we may say of chemical action that it is different from all the other forms of energy in producing an entire change in the essential nature and properties of the bodies upon which it acts. It results from changes in the relationship of certain small particles of matter called atoms. "An atom, therefore, is a particle of matter so small as to be incapable of division by the ordinary physical or chemical methods, and it represents the unit of matter in chemical changes."

Recent discoveries, however, in regard to the properties of radio-active bodies, indicate that their atoms are undergoing constant disintegration, and our ideas respecting the divisibility of atoms have to be modified accordingly. "Identical atoms unite in groups to form molecules, or dissimilar atoms combine to form molecules of compound matter."

CHEMICAL AFFINITY, AS DEMONSTRATED IN BLEACHING TEETH.

Chemical affinity is the force of attraction exerted by atoms upon each other, and differs from all other forms of energy in producing an active change in the nature and properties of the bodies upon which it acts. "This force, or affinity, varies in degree between different kinds of atoms, being less between similar than dissimilar atoms." "The structure of the hydrogen peroxid molecule shows it to be a weak one, and the affinity between similar atoms being weaker than between dissimilar ones, a compound like hydrogen peroxid tends to decompose readily under conditions favorable to a re-arrangement of its constituent atoms." The readiness with which this preparation parts with its extra atom of oxygen is its chief characteristic, and it is this that makes it so valuable a therapeutic agent. "Its activity as an oxidizing agent is not due solely to the fact that it gives up oxygen, but especially that it yields its oxygen up in its active or nascent condition."

"Sodium peroxid (Na_2O_2) differs from sodium oxid (Na_2O) just as hydrogen peroxid does from water, viz, by its union with an additional atom of oxygen. It closely resembles hydrogen peroxid in the readiness with which it gives up or parts with this extra atom of oxygen, and as in the case of bleaching with hydrogen peroxid, so in the case of sodium peroxid, it is the extra atom of oxygen in the compound which, when liberated, performs the bleaching function by seizing upon the hydrogen of the organic color compound, destroying its identity." "The saponifying action noted in the use of this agent upon the contents of putrescent roots and tubuli is due to the loss of one atom of oxygen from the Na_2O_2, which becomes Na_2O; this immediately, by combination with a molecule of water, becomes NaOH, sodium hydroxid or the ordinary caustic soda used in the manufacture of soap. The acid treatment for the neutralization of the sodium peroxid in the tubuli is responsible for the further bleaching, owing to the reaction between the acid and sodium peroxid, as follows:

$$\text{"}Na_2O_2 + 2\ HCl = 2\ NaCl + H_2O_2$$

—the latter reaction not only furnishing you with a freshly prepared concentrated solution of hydrogen peroxid thus liberated, but leaving only NaCl or common salt to be gotten rid of by washing."

The character of the salt remaining as a by-product in the neutralization of the sodium dioxid is determined by the kind of acid used—"hydrochloric giving NaCl (common salt), sulfuric yielding Na_2SO_4 (Glauber's salt), acetic acid the acetate of sodium."

CHEMICAL ACTION IN CLEANSING PUTRESCENT ROOT-CANALS.

In the treatment of the putrescent canals of teeth and of gangrenous pulps unscientific methods are often employed without any knowledge of the chemical reaction involved. No dentist should be content simply with the result of having cleaned the canals, and rendered aseptic the walls of a root without knowing how or why he accomplished it. To the investigating mind the knowledge must be brought that the contents of canals in such condition consisted of albumin in various stages of decomposition, fatty acids, gas combinations, such as hydrogen sulfid, phosphoric and carbonic acid, ammonia, and nitrogen. The chemical metamorphosis brought about in the

treatment of this condition by the introduction of such elements as potassium and sodium evidences the following chemical reaction, which cleanses and sterilizes: "The two alkali metals introduced, coming in contact with a watery liquid saturated with the above-mentioned gases, develop considerable heat in the production of potassium and sodium hydroxid and hydrogen. The potassium and sodium hydroxids unite with the fatty substances to form soap, hence the characteristic odor. The hydrogen partially burns up; after reaction has ceased, the alkaline soap and free alkali develop their effects, rendering albuminous matter soluble."

CEMENTS.

The composition of the many cements used in filling teeth are chemical reagents, and in their manipulation we perform a chemical operation. That we should understand the nature of the elements here used, their relative combining value, and the conditions most favorable to chemical substitution, is of great importance toward the attainment of uniform results. Not only is this true of and applicable to freshly mixed cements which have a decidedly acid reaction, due to free acids or acid salts, but if we moisten a piece of cement that has become hard, we find that it, too, readily gives up acid. The question presented here is, whether this capacity of phosphate cements to impart acid reaction upon surrounding structure may not have a decalcifying effect upon cavity margins permeated with moisture, particularly at the neck of a tooth.

OBTUNDENTS FOR SENSITIVE DENTIN.

In the chemistry of obtundents of sensitive dentin we know that in a normal condition all dentin contains a certain amount of water. When this is removed, the function of transmitting impressions is suspended or modified. We know also that this dehydration with heat or cold produces pain, and if sufficiently violent or continuous, the irritation will induce hyperemia and inflammation. We should therefore use extreme caution when resorting to desiccation. Many chemical agents lower the temperature by evaporation; some dehydrate through their affinity for water, as absolute alcohol; ether and chloroform act chiefly by evaporation.

PLASTER OF PARIS.

The simple mixing of plaster of Paris calls for the performance of two or more chemical operations. In the setting of plaster a chemical change is produced, by which "anhydrous calcium sulfate, $CaSO_4$, is changed into hydrated calcium sulfate, $CaSo_4 2H_2O$ by the addition of water." $CaSO_4$ is sparingly soluble in water, and imparts to it a property of hardness.

When an element like sal soda is made use of to soften the water, another chemical change takes place, as is shown by the following equation: "$CaSO_4 + Na_2CO_3 = CaCO_3 + Na_2SO_4$." In using an agent to produce this result how many of us are aware of the experiment in chemistry?

Plaster, being slightly soluble in water, imparts that unpleasant hardness, to relieve which, sal soda, coming in contact with plaster in solution, "exchanges its CO_3 for SO_4 of the plaster compound, precipitating calcium in the form of chalk $CaCO_3$, leaving a solution of sodium sulfate Na_2SO_4, an entirely different combination."

IRON AND OTHER METALS AND THEIR EFFECTS UPON THE TEETH. GREEN STAINS.

Of all metals, iron performs the most important part in the physiology of life. It forms an essential constituent of the animal body and of many plants, consequently is being taken into the mouth in minute quantities in food and in the form of medicines. In regard to its action upon the teeth, we may conclude that all preparations of iron that have an acid reaction are deleterious. Iron in contact with wooden structure, subjected to air and moisture, is destructive; iron spots on linen kept moist cause disintegration. This action is due to an alternating oxidation and reduction, the iron taking up the oxygen of the air and giving it over to the organic matter with which it comes in contact, by which the latter is oxidized. In the chemistry of iron preparations met with in the mouth, the most important consideration is whether the iron itself, apart from acid reaction, has any effect upon the teeth. Some authorities pronounce iron to be the cause of the green stain seen upon the teeth. We know that iron in connection with organic matter may, under certain circumstances, produce a dirty green or black color. The proof of this assertion is obtained by using the test for the presence of iron. "The tooth to be examined is first brushed in distilled water, and placed for ten or twenty hours in a two per cent. solution of ferrocyanid of potassium, then immersed for about one minute in a two per cent. solution of chemically pure hydrochloric acid. Where iron is present, Prussian blue is formed."

Experimentally, the presence of sulfate of iron in the minutest quantity upon the enamel surface may be evidenced by this reaction. In normal teeth, iron has been found in the vascular tissues, pulp, and pericementum, also in the enamel cuticle, whether as a normal constituent or as a precipitate from the saliva has not been proved. Tomes expresses the view that green stains are of vegetable origin; Ottolengui that they arise from fermentation of traces of milk.

Theoretical considerations furnish very little evidence in favor of the view that green stain is produced by iron. Many salts of iron (ferrous salts) have a green color, but in the presence of air and moisture they quickly undergo oxidation, and are thereby converted into yellow or red ferric salts, so that a green iron compound could hardly exist for any length of time on an enamel surface. The teeth of persons who continue the use of iron preparations for any length of time become blackened by the formation of sulfate of iron. The statement has been frequently made that teeth in mercurial poisoning show also a dirty green deposit. It has not been shown, however, that the discoloration is due to any compound of mercury, although the conditions would be favorable to the formation of sulfid of mercury; this substance may have various colors, among them green. It is authoritatively stated by Miller that black deposits upon the teeth result from the long-continued use of calomel. If iodid of potassium is given where deposits of mercury are upon the teeth, the formation of iodid of mercury might also readily produce a greenish color. In lead poisoning the teeth are stained dark brown to yellowish green, while gums show slate-gray, blue, black, and pale violet colors produced by the formation of sulfid of lead.

In regard to the green stain spoken of, it is not the purpose of the writer to dis-

cuss whether decalcification precedes or follows its formation, but to merely account for it chemically. The disintegration, however, following its deposition, is thought to be due to oxygen. "The acidity of the stain starts a chemical action upon the enamel, dissolving it; the oxygen acts upon the organic matter." Oxygen acts upon all organic matter; in water it is satisfied with hydrogen. The acid following green stain is the result of oxidation and decomposition, where oxygen is set free. Where decalcification does not follow, the stain is accounted for by an alkaline reaction.

STERILIZATION.

"In the chemistry of sterilization it must be borne in mind that sterilization, by a chemical antiseptic, is a chemical process involving a reaction between the substances acted upon, whereby both are altered in composition." This reaction is in harmony with a law governing all chemical changes, namely, the law of definite proportions, that is—"The relative weights of elementary substances contained in a compound are definite and invariable."

"To effect complete sterilization, the amount of the antiseptic used must be in proportion to the quantity of septic matter present." "Wherever a chemical antiseptic performs its functions as a germicide, it is due to the fact that it has entered into combination with some of the elements of septic matter, and in doing so undergoes a change in composition, whereby it ceases to exist in the original."

"In sterilization of oral tissues, in health or affected, the use of chemical antiseptics involves the same restrictions as there are in general surgery. In the treatment of pulpless teeth, however, they have a legitimate field, and their results are positive, because of the lack of vitality of the tissue; hence the problem is a simple chemical process."

FINAL PLEA.

A consideration of this subject might be prolonged indefinitely, showing varied phases of chemical reaction, pointing out their results, and emphasizing the importance of their recognition when met with in the oral cavity.

Just how deserving the average dentist is of the title of Doctor of Dental Surgery, which among other attainments should include some knowledge of dental chemistry, may be left for individual consideration, with the sincere hope that reflection thereon may stimulate all members of the profession to greater exertion and deeper study of the chemical changes met with in practice. If there be any among you who have been laggard in this respect, I bid you, with Omar—

Wake! for the sun, who scattered into flight
The stars before him from the field of night,
Drives Night along with them from heaven, and strikes
The Sultan's turret with a shaft of light.

BIBLIOGRAPHY.

"Text-book of Chemistry." W. R. JONES, M.D., PH.G.

"Essentials of Chemistry." R. A. WITTHAUS, A.M., M.D.

Dental Cosmos, vol. XXXV.

EDWARD C. KIRK, D.D.S., Sc.D.

W. D. MILLER, M.D., D.D.S.

Discussion.

Dr. H. H. JOHNSON, Macon, Ga. I wish to compliment the essayist on his most excellent presentation of the subject. I am thoroughly in accord with his opinion that we know but little of this

great subject, one of the greatest in the field of science, but it is almost impossible for the busy practitioner to become a scientist in all the various branches of our profession. This impossibility we must all admit, but we should nevertheless devote as much time to the study of these sciences as our practice will permit. I have had little time to delve into these great problems myself, and have merely picked up a few points from practical observation. I have had to accept statements of scientists and to simply remember that certain agents produce certain results, and rely upon their opinion as to the cause. We need chemistry all through our work; we need to know the causes of certain phenomena. We leave a bottle of cement open, and forget that there is an affinity for water in these powders and liquids, which will absorb water from the atmosphere and become saturated and deteriorate. We leave a plaster-can open, forgetting that there is moisture in the air, which the plaster is seeking, subsequently becoming satisfied by absorption of moisture from the atmosphere, deteriorating and becoming worthless. We know these phenomena, when we stop to think about them, and yet we are careless concerning them.

In regard to the essayist's statement as to the probability of the action of acid in cement on tooth-structure, I am obliged to take issue with him. I do not believe that there would be sufficient free acid in the properly mixed and manipulated cement after setting to have any effect upon tooth structure. In fact, the bolus of cement should have been satisfied when properly mixed, and the new combination should be complete; it should have been converted into a different substance, and this new substance would have no active effect on any body in contact with it. The preserving power of cements on tooth structure, even when carelessly mixed, is remarkable, as has been proved in practice for ages past.

I frequently meet with situations in my work that make me wish I knew more of chemistry and of materia medica. I wished to combine some medicines only a few months ago, and in combining them I found that one of the ingredients which I wished especially to incorporate precipitated every time I mixed them. Not knowing the cause thereof I sought the advice of a competent druggist, whose business it is to combine medicines, and he told me that the ingredients should simply have been mixed in a different order.

Dr. G. S. Tignor, Atlanta, Ga. I wish to compliment the author upon his splendid paper. I take a great deal of pride in the fact that we have in our profession in Georgia a man who seems to be pursuing that branch of science which is most valuable and most important for our future development and advancement. I am proud that we have here Dr. Teague, who is doing a good deal of excellent work along this line, and who knows so well how to express the results of his studies. Necessarily chemistry is the basis of all sciences. The miner has to depend upon the chemist to determine through analysis the value of the composite material that he brings out of the earth. The modern farmer is utilizing this science, not only to clean the land and fertilize it before the seeds are planted, but to keep it clean and to supply it with sufficient nitrogen so that in one growth two blades may be produced where one has grown before.

One of the most difficult parts of our work is the treatment of putrescent pulps and root-canal and abscess conditions.

and our deficiency therein is shown by the indifferent manner in which some of us have been treating these conditions. Our essayist has outlined that the septic conditions in such canals and in apical areas can be overcome only by introducing such an antiseptic or germicide as will carry enough of an agent to be liberated and to unite with the septic matter so as to destroy it. Our increased knowledge in this work has made it possible to overcome these conditions by one or two applications, whereas years ago various remedies were introduced into the open canal and left exposed to the influences of the fluids of the mouth, without results. We have in recent years paid more attention to mechanical devices and means, and have made wonderful advances in that respect, but our advancement in the near future must be along scientific lines, based on a knowledge of the chemical principles involved in our operative procedures.

Dr. R. H. JONES, Winston-Salem, N. C. I wish to congratulate the essayist not only on the subject-matter of his paper but upon his most excellent delivery thereof. Too much attention cannot be paid to our education along these lines, which is merely another argument for the necessity of better education of the dentist that is being advocated in different sections of the country. I believe that the dentist should be thoroughly educated not only in dentistry, but also in medicine. To show how important that is, and without any reflection upon any individual, just witness what an exodus there was when a paper on chemistry was announced! There seems to be a lack of interest in this subject, but there is a great necessity for us to improve ourselves in chemical knowledge. Chemistry applies to almost every branch of our work, and many important conditions with which we meet in practice can be successfully dealt with only by researches in chemistry.

Dr. TEAGUE (closing the discussion). I thank you very much for the attention accorded to my paper, and especially for the very complimentary discussion which it has elicited from some of the members of the society. In closing, I wish only to add that too little thought and study is given by the profession at large to chemistry and its varied manifestations which are daily met with in the practice of dentistry. Chemistry is so interesting, and at times so compelling, that it would seem that "even he who runs may read."

The association then adjourned until the Wednesday evening session.

WEDNESDAY—Evening Session.

PUBLIC ORAL HYGIENE MEETING.

THE meeting was called to order at 8.30 o'clock Wednesday evening in Taft Hall, by the president, Dr. Hassell.

Dr. G. H. Tignor, Atlanta, presented to the audience Dr. J. P. Corley, Greensboro, Ala., chairman of the Oral Hygiene Committee, who introduced the speakers of the evening.

Dr. CORLEY, in introducing the first speaker, spoke as follows: In all the ages of the world it has been good for man to stand on the mountain-tops and commune with the angels, in order that he may have a wider vision and see things as they shall come to be, and by his efforts may bring them about. To such men we owe the progress of civilization, and as the reward of their efforts the millennium will come. When the first speaker of the evening was superintendent of schools in Toledo, and later president of the board of education, he came in touch with approximately forty thousand children; since then he has taken the platform in the interests of mouth hygiene, and has spoken to hundreds of thousands of children throughout the East, North, and Canada, and has left his impress on the people—and the end is not yet. Dr. Dowd is not a dentist, but after you have heard him speak you will agree with me that he is a near-dentist, a gentleman by birth, an educator by profession, and a lecturer on mouth hygiene because of the divine within him which will not down. I have great pleasure in introducing to you Dr. J. W. Dowd of Toledo, Ohio.

Dr. J. W. DOWD, Toledo, Ohio. There are two movements going on today which I think are the most important the world has ever seen, and they both have the same object, the preservation of that which is most important to mankind, human life. One is the movement toward the establishment of universal peace through arbitration, toward the bringing about of that time of which the poet sang—

> When the war-drum throbs no longer, and the battle flag is furled
> In the parliament of man, the federation of the world.

And yet there is another movement on the same line, and one even more important, the movement toward preserving human life by protecting it from the most dreadful army the world has ever seen, the deadly army of malevolent bacteria.

THE TOLL OF TUBERCULOSIS.

We are aware that thousands of people are dying every year from preventable diseases. Let us see just what the conditions are. Professor Fisher of Yale, I think, is the author of the statistics given by Senator Owen of Oklahoma, when he introduced in the Senate of the

United States his bill for the establishment of a department of Public Health with a cabinet officer at its head. In his introduction of that bill he said that three millions of people in the United States are sick who ought not to be sick, sick from preventable causes; that one million of these are sick enough to demand the attention of a physician and a nurse, and that six hundred thousand annually die who ought not to die—die from preventable causes. Of these six hundred thousand who die annually and who ought not to die, one hundred and seventy thousand die from tuberculosis. In the late civil war those who were killed in battle on both sides, and who died from wounds, numbered one hundred and eighty-seven thousand five hundred men; nearly as many die every year from that disease. It has been said that war is hell. What must tuberculosis be? How many die in Atlanta of that disease? We are nowadays thinking much of civic affairs. If I remember the figures rightly, the population of this city is about one hundred and fifty thousand, according to the last census. Taking the proportion of those who die from tuberculosis, one person dies in Atlanta from this disease every day. This is a terrible toll to pay for a disease that should not exist. When a man is killed on the street, and everybody knows what killed him, we usually hold an inquest to determine the cause of his death. But the time is coming when an inquest will be held over the death from preventable diseases of men who die in the bloom of youth or in the vigor of life, to discover the cause of such deaths. We say in such cases, "The Lord gave and the Lord taketh away, blessed be the name of the Lord!" This is doing an injustice to the Lord; He does not bring men into the world to be slain before their time.

THE MORTALITY OF INFANTS.

Under present conditions it is more dangerous to be a baby than it is to have the smallpox, meaning that the proportion of smallpox patients who recover is greater than that of babies who live. Longfellow says:

> There is a Reaper whose name is Death,
> And with his sickle keen
> He reaps the bearded grain at a breath,
> And the flowers that grow between.
> "Shall I have naught that is fair?" saith he;
> "Have naught but the bearded grain?"

No! I say—a thousand times No! We need the little ones for the earth—need them for happy homes—need them to grow into strong men and beautiful women who will render great service to city and country. Think of it! In the civilized world three and a quarter million babies die every year. In New York city last year one hundred and twenty-five thousand babies were born, and twenty-five thousand of them died. A farmer who would not take better care of his stock than to allow one-eighth practically to die would be arrested for cruelty to animals, and very properly punished.

THE ECONOMIC PHASE OF PREVENTABLE DISEASE.

Recently I read of an investigation, based upon the laws of the labor bureau in Germany, of the amount lost in wages in this country to the working men by preventable disease, the loss in this country to the laboring men amounting to $484,000,000, viz, about five dollars to every man and woman in the United States. On the same basis the loss in a

city like Atlanta would be $750,000 annually. Dr. Gulick says, as the result of his investigations among the school children of New York, that if there are two decayed teeth in the mouth of a child, it keeps him back in his school course six months or a little over half a year, that adenoids will keep a child back a little over a year, and it is easily demonstrable that it will pay the public to have dental as well as medical inspectors in the public schools. The annual loss, based on these figures, incurred by three millions of sick people who ought not to be sick, and one million who have the attention of nurses and physicians, as estimated by Professor Fisher, is at least $2,000,000,000. Yet, when Senator Owen introduced his bill in the United States Senate, he could hardly get a hearing, they were so anxious to find out whether coal lands, timber limits, and water-power sites had been properly conserved. Perhaps it is not too much to hope that the United States Senate may yet learn that the health of a nation is its greatest asset.

IMPORTANCE OF ORAL HYGIENE.

I have talked to a great many school children within the last year. The percentage of school children who have unclean mouths that demand medical and dental attention runs sometimes as low as 74 per cent., and sometimes as high as 99 per cent. In the schools of Findlay, Ohio, the examiners discovered that of one thousand eight hundred children examined fourteen hundred had from two to four points of caries in their mouths, and among these there were forty-seven cases of putrescent pulps, discharging pus in the mouths. Think what it means to take pus into the alimentary canal with food and drink, and to poison the whole body! It is impossible to separate general hygiene from oral hygiene, because the oral cavity has to do with nearly all the diseases of the human body. Take the alimentary canal for instance. As I look back over my life, when a young man I seem to have lived in a world of stomach-ache, troubles of digestion, troubles of the jejunum, the duodenum, and the ileum. They used to treat the whole alimentary canal for these various troubles, and it is only within late years that they have found the real offender, the oral cavity. It is a fact that if proper care be taken of this portion of the alimentary canal, if the mouth is kept clean from deleterious bacteria, and if the food is sent into the stomach properly prepared, as Mr. Fletcher says, we will not know that we have any alimentary canal. If, however, we do not keep the teeth clean, and if our food is improperly prepared, we will not know that we have anything except an alimentary canal, because there will be trouble all the time. It is being more and more generally recognized that the invasion of the body by the tubercle bacillus occurs more often by way of decayed teeth through the alveolar process and the cervical glands than by the esophagus or trachea.

The ill effects of mouth-breathing. Another subject of importance in this connection is that of mouth-breathing. There is a saying which I believe to be true, namely, that an open mouth means a closed mind. Mouth-breathing may be due to various causes, but the principal cause is adenoids. I was in South Bend, Ind., recently and talked with a gentleman who had a son in Nôtre Dame college, who for two years had done splendid work, but the next year had failed in all his studies, had become very inattentive

in his recitations, and very nervous and irritable. He brought the boy home and had him examined by a physician, and it was found that his nostrils were filled with adenoids. He had these removed, and the result was that the boy made an average of 99 per cent. in his studies after that.

Dental irregularities. Now consider irregular teeth and deformed mouths: A person with such a deformity is sure to have bad physical development. Consider the girl who has a protruding upper jaw, with the lower jaw coming up under the upper one because of that species of mayhem known as extraction of the first molar. Such a girl is handicapped in the race of life.

THE VALUE OF SOUND TEETH.

There can be no bewitching smile that does not break in lines of beauty over gleaming ivory; there can be no rippling laughter that does not flow over radiant pearls. The southern poet Poe has described a fine mouth in lines worthy of a place on the walls of every dentist's office:

And all with pearl and ruby glowing
Was the fair palace door,
From whence came flowing, flowing, flowing,
And sparkling evermore,
A troop of echoes whose sweet duty
Was but to sing
In voices of surpassing beauty
The wit and wisdom of their song.

In any position where men stand above their fellows, you will usually find them to be of strong physical powers, dependent on a good digestion that waits on a good appetite, that waits on good teeth. I do not know a more splendid example than that son of America and grandson of Georgia, Roosevelt. He feels so well that he cannot keep still; he is always doing something, because he has such abundant vitality, depending upon nutrition, that depends upon digestion, that waits upon appetite, that waits upon good food, and, as far as he is concerned, does not have to wait long for good teeth—those teeth which are alike a terror to the lions of Africa and the bulls and bears of Wall street.

ORAL HYGIENE AND TUBERCULOSIS.

Oral hygiene is the first defense that must be instituted against the great white plague, that disease which plays no favorites, which enters with stealthy tread into the cottage of the lowly, the mansion of the rich and the palace of the noble, and, wherever it goes, it goes to kill. Sometimes it does its work quickly, but oftentimes there are many weary years of wasting sickness and suffering before the victim passes to the friendly earth, his native home. You remember the terrible plague of the death of the firstborn in Egypt. The Bible says: "There was not one house where there was not one dead." Tuberculosis is even worse than that, and there is no one, as in those old days, to sprinkle with blood the lintels and doorposts of our houses, that the death angel may spare and pass by. The Jews to this day celebrate the feast of the Passover in commemoration of the deliverance of their own firstborn. I like to think that in this twentieth century the world is so learning the great lesson that cleanliness is health that there may be in after-ages an annual "feast of cleanliness" in celebration of this great awakening.

THE DENTIST'S DUTY.

In closing I wish to say a word about the dentist. I think the dentist should not assume a subordinate position, but

should push to the front, and place himself at the head, where he belongs. Dentistry is one of the great forces in this modern movement for the conservation of human life. And in the broad phalanx arrayed in defense of the health, strength, and beauty of the race the dentist is easily in the front rank, for he stands at the gateway with the white sword of sanitary science in hand ready to strike down the destroyers that would enter the citadel of human life.

Dr. Corley then introduced Dr. W. W. BELCHER, Rochester, N. Y., who addressed the audience on "The Establishing of a Free Dental Dispensary," as follows:

The Establishing of a Free Dental Dispensary.

By WM. W. BELCHER, D.D.S., Rochester, N. Y.

I COME to you from near the borderland of our possessions; sixty miles of the waters of Lake Ontario is all that separates us from Canada, "Our Lady of the Snows."

I come a long distance to tell you a short story, although just why I should have been selected for this work I do not know. Dr. Corley has been in your midst, preaching, praying, coaxing, pleading mouth hygiene for a decade. Perhaps it comes with more force to hear the truth from the lips of a stranger in your land, as it is said, "A prophet is not without honor, save in his own country."

This movement of mouth hygiene has come to stay; it will not down, and has ceased to be classed as a fad, and some who have in the past come to scoff have remained to pray, and it is daily gaining new converts.

THE IMPORTANCE OF ORAL HYGIENE FOR THE DEVELOPMENT OF CHILDREN.

It is an established fact that many adults can get along fairly well without teeth, but a child *must* have a suitable masticating surface to take care of his physical and mental development.

Why must a child have a good masticating surface? A baby is born weighing about eight pounds; he must double in weight within a year; if he fail in this, he goes down and out. Once having doubled in weight, he must continue, and at the school age should weigh about forty pounds.

This child on entering school has a new problem to face; he must continue his physical development and assume the burden of his mental equipment. If he has from four to fourteen cavities in as many teeth, if his teeth hurt him in chewing, his muscles of mastication are gradually weakened from lack of use.

Many of his decayed teeth are ulcerated and discharge their quota of pus into the stomach, contaminating every mouthful of food and disarranging the digestive apparatus. The uncared-for mouth is the breeding-place of germ life; twenty harmful varieties have been found in the human mouth, including those of tuberculosis. Enlarged tonsils, glands, adenoids, throat and eye trouble are thus invited. "A clean mouth turneth away trouble" is just as good a proverb as "A soft answer turneth away wrath."

Children in the past have thrived and done creditable work in our schools in spite of faulty mouth conditions, adenoids, defective hearing and eyesight. They have thrived in filth, and with mental handicaps have "made good," not because of these, but in spite of them. The wonder is that they have done so well, that more did not fall by the wayside. But this is no excuse for perpetuating these conditions, now that we have learned to recognize them.

Ninety per cent. of our diseases are introduced through the mouth, and unless proper care is exercised in guarding this gateway, this portal of life and death, disease and many local disturbances in associate parts, and general derangement of the nutritive system are invited. Now that our attention has been called to this fact, so simple and self-evident, we wonder why we did not recognize it at an earlier date.

THE ECONOMIC PROBLEM IN ORAL HYGIENE.

That physical defects are one of the greatest hindrances to the mental development of the children of our schools is recognized by educational bodies, and the correction of the same is the problem of the day. The members of our boards of education in every part of the country are keenly alive to these conditions and are anxious to correct them, but cannot afford to make experiments. They are answerable to the public—to the man with a vote—for their support, and unless the public is educated to the value of such services, they cannot introduce such reforms in the schools.

We have provided expensive buildings and equipment, modern text-books, and a carefully selected teaching force—to what end? "To minister to a mind diseased." We are just awakening to the fact that a large percentage of our children, for whom this great expense has been undertaken, are unable, because of physical ills, to assimilate the instruction so carefully planned.

Before these children can avail themselves of the full benefit of school life they must be cured of their diseased bodies, and the handicaps to their mental development must be removed, not only for their own benefit, but that they shall not spread their defects to others.

It costs the city of Rochester in round figures $1,000,000 per year to educate its children. Think of the portion of this amount that is wasted in trying to educate, to force information upon, children who are physically unfit to receive the instruction offered to them. But correction of this condition is only a small part of the benefit to be derived. The increased happiness, the better citizenship, and increased earning power of these children are the greatest asset. Dr. Luther Gulick of New York has made the statement that the education of each child costs the municipality $30.00 per year, and that adenoids will retard them six months in their studies. This is waste, woful waste, and would not be tolerated in any business enterprise. Not even a church or a Sunday-school would be managed that way.

THE WORLD-WIDE SPREAD OF THE ORAL HYGIENE MOVEMENT.

The mouth hygiene propaganda is not confined to any country or climate, it is world-wide. Germany has fifty free dental dispensaries. The city of St. Petersburg, Russia, a country upon which we are apt to look as unprogressive, has nine such dispensaries for its worthy poor school children. Two hundred commu-

nities in the United States are contemplating the establishment of free dental dispensaries. Those now established are located in Cleveland and Toledo, Ohio, and Rochester, Watertown, and New York, N. Y. Boston has the new Forsyth Dispensary, with half a million dollars endowment for its establishment and maintenance; Lynn and Brookline, Mass., has each a dispensary. Philadelphia, Reading, Trenton, Newark, Paterson, Elizabeth, and Camden, N. J., have each one, and a recent law allows any city in the state of New Jersey to add $1000 to its tax rate for the establishment of a free dental dispensary for the treatment of the worthy poor. Spokane, Wash., Kansas City, Milwaukee, and San Francisco represent the West. Salem, Mass., Elmira and Brooklyn, N. Y., are about to take up this work.

ORAL HYGIENE IN THE SOUTH.

How many cities in the South have joined this movement? Oh, you dentists of the South—not one! What is the matter? "Why stand ye here idle all the day?"

Is there anything about this glorious climate of yours that makes it unnecessary to establish free dental dispensaries for the worthy poor in your schools? Have you any less affection for your children? Surely not.

Statistics from all parts of the world tell us that from seventy-five to ninety-eight per cent. of all school children are suffering from decayed teeth. No one condition is responsible for so much suffering of child life, so influential in retarding scholarship.

It is not climate, it is not your lack of affection for the children, it is not your lack of need of this work.

Why do you not have a free dental dispensary in one of your schools in Atlanta, the "New York of the South"? Why not have lectures in your public schools to teach the children the value of Mouth Hygiene?

You have the material at your very door. When we wanted the best man in the Union to deliver a course of lectures on this subject before our children, we came to the South and secured Dr. Corley, and never were lectures listened to by our children with so much attention and benefit as those presented by him on mouth hygiene.

INSTRUCTING CHILDREN IN ORAL HYGIENE.

Dr. Corley has the happy faculty of instructing and entertaining children, at the same time reaching down and entering into the spirit of child life without sacrificing dignity or control. He did wonders with our pupils; there is hardly a scholar in our public or parochial school who does not know something about his teeth. The stories that are carried home to the parents, and the childish insistence upon tooth-brushes and powder as a result of these teachings have been a matter of great surprise. In some of the schools, tooth-brush drills have been instituted as a part of the school work and are much enjoyed.

To the smaller children we give a rhyme that goes as follows:

One, two! Here's fun for you!
Three, four! Open the door [*the mouth*].
Five, six! A row of white bricks [*the teeth*],
Seven, eight! So clean and so straight.
Nine, ten! Brush them again;
Eleven, twelve! Soon you'll do it yourself.
Thirteen, fourteen! Now we're a-sporting!
Fifteen, sixteen! All around reaching.
Seventeen, eighteen! A little more waiting;
Nineteen, twenty! Now they're clean a-plenty.

You must instil into a child the pride of good looks, the contempt for the nasti-

ness of "mouth garbage," and this will do more good than all statements of health and future payments. Children dwell in the present, and if they once understand that a clean mouth and white teeth add more to good looks than fancy hair ribbons, the battle is half won. One little girl who came to our clinics with eighteen cavities in her twenty-four teeth requested that her teeth be cleaned first. On being questioned she said that the other children had noticed her unclean mouth and told her she had "moss" on her teeth; they had plagued her so much that she had cried about the matter.

Again I ask, Why do you not have a free dental dispensary in at least one of your public schools in Atlanta? Is it because your school board is not up to date and fails to recognize the need of this work—because they would not welcome your help if you offered to place an equipment in one of the schools and give your services for a year to demonstrate the usefulness of this work? Surely not. Such splendid buildings and prosperity as I see on every hand in your city all cry out their protest against such a condition. You cannot longer dodge this work in the South. You must all cooperate and eliminate petty jealousies, and each put your hand to the wheel. You must educate your public, your health office, your mayor, your councilmen, your board of education, your minister and priest. They are your friends, or can easily be made so, if proper effort is used to get in touch with them. But you must have tried men and true, honest and earnest workers.

CAUSES OF FAILURE OF THE ORAL HYGIENE MOVEMENT.

The causes of failure in establishing this work may be divided into three classes: First, indolence; second, timidity or lack of faith, and third, the worship of the almighty dollar.

Indolence. It is so easy to sit down and do nothing and say a thing is impossible. Impossibilities are the half-hearted efforts of quitters. The only thing that is impossible is something that cannot be imagined. Half of greatness is grit, and the man who cannot take up a thing and see it through to the finish is beaten at the start. If he has not pluck enough to hang on, he must hang back, and even when opportunity presents itself, he cannot tell it from a case of measles. We cannot afford to regulate the pace of progress to that of the laggard. The lazy man has failed in every spot; he is a weed in the way of progress, a sterile seed which the winds may drift to a dozen rich soils, but which never takes root; he is always a misfit, a howler who blames his environment, his generation, his fellows—never himself.

Not geography, nor time, nor environment can hold down a fighter; you have one of the finest illustrations of this in your own midst. Mr. Flagler, a man of wealth, over eighty years of age, doing the impossible, constructing a railroad half way to Cuba along the Florida Keys. His only concern is that he will not live to see its completion. General Scott, of the Mexican war, said to the aide who informed him that his army was beaten to a standstill: "What time is it?" and when the answer came: "Four o'clock," he said: "Well, if we have lost this battle, it is time enough to win another before the sun sets. Give them hell, boys!" and the lost battle became a victory.

How the heart warms up to such men—they did not have to have opportunity labeled! Failure is not a disease of locality; it is a personal habit.

Timidity. What are you afraid of? I know what it is—we have had the experience. Money! It costs money to establish a free dispensary, and a lot more to keep it in operation.

Where will we get this money? That is the easiest part of the whole problem. If you only have faith in yourself and your cause and work, you can get all the money you can use, perhaps more than is good for you at the start. You have the greatest opportunity to talk as to the worthiness of your charity as compared to any charitable organization in the world. Charity!—there is no charity for a child. Have not these children, born into the world without their consent, children of the worthy poor, in this glorious country of ours, a right to have their teeth attended to? If the parents cannot afford to have this done, then the state should step in, and, for its own protection and ultimate benefit, insist that the teeth of its future lawgivers and governors shall be taken care of. "For the child, not charity, but justice!" The very worst thing that can happen is that you have taken care of the teeth of some child whose parents could afford to pay for the same. You have been fooled by a child, but he has been benefited. He did not come to you for services that he did not sorely need. He would sooner break into jail than have his teeth attended to. It is not like a charity where a family receives half a dozen Christmas baskets when they really deserve one.

When a dentist gets busy and goes out to do something for somebody else but himself, and shows that he is not a "tightwad," the public is so surprised that people come to his assistance and he finds them, unasked and unsought, extending the recognition which he had been so eagerly seeking.

Money—Rochester's example. There is said to be in the city of Cleveland a church which has for years been supported by Mr. Rockefeller, and as a result the congregation will not spend even a ten-cent piece to mend the roof. They have been pauperized by one man's generosity.

In the establishment of our first free dental dispensary in Rochester we were very much in the same position. One of God's good men, the late Captain Lomb, gave us $600 to establish the dispensary, and the society, with contributions from the dental trade and local merchants, duplicated his gift and opened a dispensary valued at $1200. The first year the dentists furnished their services, and the charity was in operation three afternoons each week. Our benefactor, seeing the need of the work, consented to supply the funds to keep it open each day, and paid the salaries of two dentists.

From that minute everybody not closely associated with the work lost all interest, and soon there was developed one of the finest anvil choruses in the land. No one had to give up anything, all they had to do was to criticize those in charge. When our benefactor died and left no funds for the maintenance of the free dental dispensary, we thought it the greatest of calamities. In reality, it was a blessing in disguise; we had to get out and hustle. The public was asked to help in the support of the dispensary, and they commenced to take an interest in its existence. Before this time they had never even heard of it. One of our first steps was to approach one of our wealthy philanthropists; we wrote him a letter asking him for a five minutes' interview in regard to the needs of our charity. He replied that, as he was just going to Europe, he could not spare the time for even a

five minutes' interview, but he inclosed his check for $200. What we were expecting was that he would offer to take up the work and furnish all the funds. If he had done this, we would have been placed on the pauper list again, and our charity would not have amounted to a hill of beans.

Now, as the result of our own efforts,we have three dispensaries and the promise of a fourth one, have recently finished an educational campaign costing us nearly a thousand dollars, and have a balance of over $2500 in the treasury.

Our membership has doubled in three years. We publish a journal, the *Dental Dispensary Record,* devoted to mouth hygiene, which is now in its second year, with a circulation of over two thousand copies of each issue. I would like to say in passing that the *Dental Dispensary Record* does not share in this $2500 balance of the dispensary work; it stands or falls on its own merit, and were impossible without the support of the profession. Part of my mission on this Southern trip is to add to its circulation and advertising pages. Every cent goes back into the publication, and we are trying to make it bigger and better with each issue.

This, gentlemen, is our personal experience with the money question. Banish fear! Have faith in yourself and your charity, and every door is open to you!

THE OPPORTUNITY OF THE DENTAL PROFESSION.

To no other profession was there ever offered the heaven-given opportunity to prove to the public that we are the equals of our medical brethren. It only needs that each of us do his part to place the profession on a higher and broader base. Emerson has said, "He is great who confers the most benefits; he is base—and that is the one base thing in the universe—who receives favors and renders none."

In this work we have been too willing that others should recognize the great need—that they should establish free dental dispensaries, and that the dentist should be asked in as a hired man to cooperate with some children's aid or humane society. Most of the dispensaries thus far established owe their existence to the incentive of a wide-awake public, and the dentist is lagging behind. There never was a man who was worth a fig but had to find the grindstone and run himself up against it until he developed an edge that would cut something.

Men of the South, are you ready to assume your part of this burden? Are you lifting your pound in this work or are you plugging after the dollar and allowing the other fellow to carry your share? The dentists of Rochester have shown that they can work together, that they can manage and finance their own charity, and in doing this, we have had the help and co-operation of the best of the medical profession of our city, and we owe them a debt of gratitude. To accomplish these results, we have had to work together; there has been an absence of small jealousies and of the cultivation of an exaggerated ego. Not that we are lacking in an anvil chorus who tell us how much better they could do things, but, when the opportunity presents itself to do a little work, they refuse, because they do not like the absence of hair on the head of the chairman, or they do not believe that some dentist is sincere, etc.

We find such people everywhere, even in the churches. Just what these people intend to do when they get to heaven and

find there some of these earthly objectionables and have to associate with them, it is difficult to say.

This work gets into your blood. Let who will ask, Where is the fruit? The hand that shuns the thorn must lose the rose. The greater the difficulties, the more you love the work, and its value and usefulness grow on you until you cannot give it up if you would.

The writer has been interested in church work, has contributed money to the heathen and the Y. M. C. A., but the same effort when applied to this work within our own profession, for which we are fitted, is much more satisfactory.

Mr. Rockefeller, the oil king, said in addressing his Sunday-school class: "You get out of a thing just what you put into it," and I wish to rise and indorse the truth of these words.

Quoting Emerson again, he says of the man who is doing the work: "He has gained facts—learns his ignorance; is cured of the insanity of conceit; has got moderation and real skill. . . . Do the thing, and you shall have the power; but they who do not the thing have not the power."

Dr. Corley next introduced Dr. W. A. White, Phelps, N. Y., who spoke as follows:

So much is connected with the subject which we are considering tonight, oral hygiene, which you have heard so delightfully discussed and presented by the gentlemen who have preceded me, that I will not touch upon the same phases of oral hygiene or prophylaxis, but will confine myself to that portion of the work in which I have been particularly interested.

In addressing school children I am careful to first impress upon their minds the importance of oral prophylaxis, which you know means prevention. If you will go to any one of the schools in my neighborhood and ask the children what is the meaning of prophylaxis, you will hear them say in one grand chorus—Prevention. Ask them the meaning of hygiene and you will get the response—Preservation. The importance and the necessity of learning and remembering the definition of the words prophylaxis and oral hygiene seem to have been impressed upon their minds. You are well aware that the watchword of modern medicine is prophylaxis. The work which has already been done by the dentist along the line of oral hygiene has been brought to the attention of the medical profession, and they are beginning to realize the importance of this subject for the present and the coming generations.

THE ESTABLISHMENT OF THE ORAL HYGIENE DEPARTMENT OF THE STATE BOARD OF HEALTH OF THE STATE OF NEW YORK.

In taking up this work outside of my own profession, I realized the importance of the co-operation of the educational bodies, meaning not alone the boards of education, but the school teachers, and particularly the women teachers. I believe it to be just as essential for female school teachers to understand the benefits to be derived from oral hygiene and prophylaxis as it is for the dentist to educate his patients; for they are in a position to educate the children who in later years are to become patients of those to follow us. It was this idea that suggested to me to induce the State Board of Health of New York to establish a department of oral hygiene. What I have done I be-

lieve can be duplicated by the dentists of the state of Georgia, and every state in the South or any other section. I believe that you, like myself, are acquainted with some members of your state boards of health. I am sorry to say that I believe the average member of your local boards of health and your state boards of health is as ignorant of what can be accomplished through the instruction of the children in prophylaxis and oral hygiene as any class of people on earth. This statement is based upon my personal experience with persons occupying positions involving educational problems. When I first broached the subject to the deputy commissioner of health, he said he did not believe it would even be considered; when I presented to him the facts as to what we had accomplished in Rochester, how the children had improved in physical and mental condition after having received dental care in our dispensaries, he gave the subject further consideration, and finally, through his influence, I obtained an audience with the present commissioner of health, Dr. Eugene H. Porter of Albany, who granted me an audience to present the matter. I laid the bare facts before him as to what we had accomplished in Rochester and other localities, and he promised to take the matter under consideration. Much to my surprise, a short time afterward I received an invitation from Dr. Porter, asking if I was willing to present a paper on the subject of oral hygiene and prophylaxis at the annual meeting of the State Board of Health. I hesitated, and finally declined. I thought it would give more dignity to the occasion and to the dental profession if I could secure the services of one who stands higher in the oral hygiene world than myself, and selected Dr. W. G. Ebersole, chairman of the Oral Hygiene Committee of the National Association. Dr. Ebersole responded favorably to my request, and Dr. W. W. Belcher of Rochester and myself consented to discuss the paper. The paper was accordingly presented, and, following its reading and discussion, some of the oldest men in the medical profession in attendance at that meeting came to me personally and confessed that their eyes had been opened, since they had not realized that the subject of oral hygiene was of so much consequence to the general public. I then requested Dr. Porter to take under consideration the addition of an oral hygiene department to the State Board of Health, and he promised to consider it.

The meeting to which I refer was held last November, and at the next meeting of the board, held on December 7th, by unanimous vote an "oral hygiene department" was added to the State Board of Health of the State of New York. Dr. Herbert L. Wheeler of New York and myself were appointed oral hygiene lecturers and consultants to the board, and much to my surprise one of the first requests made of us was to meet with the board and the forty-two lecturers connected with it who give lectures on tuberculosis, and to give them instruction in oral hygiene. The result was that Dr. Wheeler and myself were empowered to secure everything necessary to carry on a successful oral hygiene campaign in the schools throughout the state. We were given *carte blanche* to purchase the slides and lanterns needed for the work, and were allowed ten dollars additional for every lecture delivered. When this work was started, it was surprising how many calls came from various parts of the state by gentlemen in charge of educational institutions, asking that a

lecture be given at their school. Since my arrival here I have received calls asking for lectures in different parts of the state, and I believe the time is not far distant when the question of oral hygiene will receive as much attention as any other subject now being taught in the schools.

I will close my remarks by asking that at the present meeting the Southern Branch of the National Dental Association appoint a committee from each one of the states included in the Southern Branch, to consult with your state boards of health and see if they cannot bring about the establishment of an oral hygiene department in connection with the state boards of health.

Dr. B. Holly Smith, Baltimore, Md. One of the speakers spoke of the difficulty of getting medical men to appreciate the importance of oral hygiene.

EXAMINATION OF SCHOOL CHILDREN'S TEETH IN BALTIMORE, MD.

Some twenty years ago representatives of our state association went in a polite and deferential manner to our school board and asked for the privilege of making some simple tests to show the importance of this work. They were insulted and rudely invited out of the room. The next year they went back with much the same success. Fortunately for human progress, however, those commissioners passed away—to get their reward, I hope—and finally I received a few weeks ago a note saying that at the last meeting of the school board a resolution was passed that the Oral Hygiene Council be invited to examine the school children's mouths. The board also stated that they would like to have an infirmary established in one of the school buildings, and the mouths of the children of the parental schools examined and if possible restored to normal condition.

We in Baltimore are greatly gratified at the prospect of this altruistic service. The work in the parental school has been under way, and in the examination of the mouths of forty of these truant and refractory children we found that not a single one had ever had any dental service save extraction, and that their mouths were in a deplorable condition. I believe that it would take ten times as many dentists as we have now to give adequate service to all the people.

Dr. L. A. Crumley, Birmingham, Ala. Some of us have, for a number of years, been hearing and reading about mouth hygiene and prophylaxis, and the treatment of the teeth of those children of our public schools whose parents and guardians are not able financially to secure for them such service.

THE ORAL HYGIENE MOVEMENT IN BIRMINGHAM, ALA.

We have been reading and hearing of the work which has been and is being done in a number of the cities of our country, such as New York city, Rochester, N. Y., Cleveland, Ohio, and others, and some of us are of the opinion that, if this work can be done in those cities, it can and ought to be done in Birmingham, Ala. The Jefferson County Dental Society, at a meeting held recently, passed a resolution in which members agreed, first, to inspect and record the mouth conditions of all pupils in our white public schools; second, to deliver lectures on mouth hygiene in all our white public schools; and third, to operate a free dental dispensary for poor children six days in the week for one year. Each of the gentlemen who signed this resolution agrees to give his share of

money and time necessary to the accomplishment of the work of making the inspections, giving the lectures, and manning the dispensary. This action of the Jefferson County Dental Society is indorsed by forty-four men, the names of other members of the society still to be added to the agreement. We have come to a time in the history of the dental profession when the dentist is accepting his credentials, his diploma, and his license granted by the dental examining boards to practice in the commonwealths of this country as a trust, and the people are holding and are going to hold us responsible for that trust. We are beginning to recognize the fact that future generations will read our history, and it is for us to say whether that history shall read, "Well done, thou good and faithful servant," or, "Weighed in the balances and found wanting." The Jefferson County Dental Society (Birmingham, Ala.) is assuming this obligation, and I am glad to say that our board of education has agreed to assign us a room to be equipped for this work, and, by way of co-operation, to give every other aid and encouragement possible. I wish further, in this connection, to express the appreciation of our society and the people of Birmingham for the support which has been extended to us by the Oral Hygiene Committee of the National Dental Association.

Dr. Corley then declared the meeting adjourned until Thursday morning.

THIRD DAY—Thursday, April 6th.

The meeting was called to order on Thursday morning at 9.30 o'clock, by the president, Dr. Hassell.

The first order of business was the report of the Executive Committee, which was read by Dr. Cottrell, and adopted by the society.

Dr. Melendy presented a communication from the Miller Memorial Committee, and moved that it be referred to the Executive Committee. (Motion carried.)

The next order of business as announced by the President was the reading of a paper by Dr. H. C. Brown, Columbus, Ohio, entitled "The Reorganization of the National Dental Association," as follows:

The Reorganization of the National Dental Association.

By H. C. BROWN, D.D.S., Columbus, Ohio.

In explanation of the title of this paper, I would state that in his invitation your president named the subject as above. I make this statement in order that my position may be understood; for otherwise some might think that in my official relationship to the National Association I was assuming too much authority.

It is my purpose to treat this question with frankness and fairness, appreciating that the best results can be secured by such discussion. In view, however, of the arrangements for having representatives from the various organizations meet in Cleveland just prior to the National, I will not outline any definite course as to how this reorganization should be brought about, other than in a general way, since it might be charged that I was attempting to create sentiment for some particular plan.

REASONS FOR THE RETARDATION OF PROGRESS OF THE N. D. A.

The National Dental Association and its predecessors, the "American" and "Southern" Dental Associations, have conjointly passed the half-century mark. During this period dentistry has advanced so rapidly that the other professions and the laity have marveled at its progress. A large percentage of the membership of these associations has always been in the forefront in this advancement, but regardless of this, it is to be regretted that this association, as an organization, has not kept pace with the progress of the profession. There may be a number of reasons for this, but I shall only consider a few, as follows:

INADEQUACY OF THE CONSTITUTION.

First, it seems to be the consensus of opinion that our constitution—not our

constitution and by-laws, for we have no by-laws—is not suited to our present requirements, or at least, if it is, then it is not interpreted in a manner to secure the best results. We will not assume that there is any misinterpretation, or, if there is, that it is intentional or practiced to deceive, but we will quite readily agree that there is ample room for improvement. This should be accomplished by a most careful amending, or by adopting a new constitution and by-laws in accordance with a thoroughly representative plan, as hereinafter outlined.

RELATIONSHIP TO LOCAL AND STATE SOCIETIES.

Second, it seems reasonable to assume that the local and state societies have, with their rapid growth of recent years, detracted somewhat for the time being from the National Association. This is largely due to local and state pride, together with the hesitancy which most dentists have of sacrificing, as they see it, much time or expense in attending dental meetings, this sacrifice being usually necessary with reference to the sessions of the National Association—or at least two years out of every three. We should, however, not consider the development of these organizations as detrimental to the National Association, except temporarily, as has been mentioned. This temporary detriment has been brought about by the fact that in developing the local and state organizations, about all of the time and energy has been consumed which many have felt disposed to devote to organization work.

On the other hand, we should recognize the local society as the unit of both state and national organizations, and accept the opportunity presented through such preliminary work as necessarily essential to a similar growth in the National Association, thus taking advantage of the favorable conditions to adopt a new constitution and by-laws, which will make possible an equitable and a representative National Association. The local society interests and develops its members for advanced usefulness in the state society, and likewise the state society offers opportunity and inducement for further advancement in the National Association, thus making possible the hearty co-operation of all in a manner whereby the best results can be secured.

The question of a national dental journal. In this connection the question of a national dental journal can be briefly considered, as its relation to the reorganization is important; but it should come second, not first, because we should first adopt some plan for largely increasing our membership before starting a journal, which would be the only safe business proposition. But when an increased membership is secured and the journal established, these two should work together with decided advantages to both. By such recommendation no criticism of our present journals is intended, since they have very liberally contributed to our advancement, but as a National Association such as we hope to have at an early date, we should publish and support a journal. If we become well organized and do not publish our own journal, we shall not measure up to that standard which naturally will be expected of us as a profession with some forty thousand members.

"POLITICS."

Third, some contend that there is too much "politics" in the National Association, and that it is conducted principally in the interest of a few who belong

to the "ring" which is supposed to be in control. In discussing the political phase of this question, as some see and name it, I must first admit that I do so with more or less timidity, inasmuch as this is a term frequently used when some other term is really intended or would be much more appropriate. In this connection there seems to be an indistinct borderline somewhere between the terms "successful" and "political," which is not easily distinguishable, especially by the two most interested classes or factions, if such we may name them. The ones may feel disappointed and be liable to ascribe unworthy motives or political methods to those who do not agree with them and who have been successful. The others may feel elated and accept preferment as a recognition of ability, and adopt a system of management which was not even contemplated by those contributing to such promotion. Assuming more authority than that which is patent to an unbiased individual is very liable to create dissatisfaction among those who have been defeated, and bring about disastrous results to those who have been successful. When conditions are such as to necessitate a contest, it should be so conducted that those defeated should be "good losers," and those who have been victorious should be keenly sensible of their increased responsibilities.

Much of this "political" criticism has come from non-members, which indicates that these critics have arrived at their conclusions by observing the situation from a distance. Recognizing this, we are impressed with the fact that the same untiring energy, if expended by members in promoting the interests of the association, would certainly be more in harmony with what would seemingly signify an honest desire for the National Association to assume a position of greater usefulness.

There are some well-established principles which apply alike to commercial and professional organizations, and it probably would not be amiss to state that the latter could advantageously adopt some of the aggressive policies of the former. Membership in a professional organization, with years of intimate affiliation, associated with more or less official responsibilities and an earnest desire to advance its interests, can be compared to an individual's having a considerable financial investment in a business proposition which he has assisted in developing, and in the future of which he is deeply concerned. In either case, little criticism should be made when such a person or persons use business foresight and carefully consider in advance some of the problems which will sooner or later confront them. Likewise, the exercising of such personal influence as seems advisable to them in order to promote and keep such organizations intact should not be too severely condemned. You may call this "personal influence," "business foresight," or "political manipulation," just as you may prefer, but the only restrictions I would place thereon is that such persons should always conscientiously labor for the best interests of the organization by placing themselves and their friends second to its welfare.

SOME REQUISITES OF MEMBERSHIP.

To better show what I consider necessary for a well-regulated dental organization, I quote from a paper read before the West Virginia State Dental Society, last October: "I consider that four distinct classes are essential in conducting a successful state or national organization, as follows: Those with some busi-

ness or executive qualifications for conducting the general affairs of the organization; those of a scientific trend of thought to investigate problems too deep for the vast majority; those possessing more than ordinary mechanical ability to develop and advance the practical side of our profession, and last but not least, those who attend the meetings, aid in committee work or such other duties as may be assigned to them, and encourage the other three classes to do their best work by their presence and loyal support. This last class constitutes a large majority of such members, and they are the ones receiving the greatest benefit."

We are most fortunate in living under a democratic form of government, and should be accustomed to the majority regulating our policies, but this majority should ever bear in mind that anything short of reasonably satisfactory service will sooner or later bring about a reversal of conditions. Therefore as a profession we should affiliate with our dental organizations and industriously work for those issues which seem to be for our best interests, remembering at all times that unsupported individual views, even though possessing much merit in the originator's estimation, are not ready for general promulgation, but will require time in order to educate others to appreciate and support the same.

ACTION OF THE REVISION COMMITTEE, APPOINTED AT THE BOSTON MEETING OF 1908.

This question of reorganization received much consideration at the Boston meeting in 1908, and a Revision Committee, consisting of Drs. J. D. Patterson, B. Holly Smith, and S. A. Hopkins, was appointed. A report was presented the following year at Birmingham, and the committee continued. The resolution embodied in the following letter states what action was taken at the Denver meeting last year:

To ———— State Dental Society,
Care of Dr. ————, *Sec'y.*

GREETINGS!

The question of reorganization of the National Dental Association has been conspicuously before the profession for some time, with various suggestions, recommendations, amendments, and resolutions, but without results. However, it would seem that conditions are most favorable for an harmonious termination at the Cleveland meeting July 25 to 28, 1911, if the co-operation of all organizations named in the following resolution, which was adopted at the Denver meeting last August, can be secured:

"RESOLVED, That the Committee on Revision of the Constitution and By-laws be continued and that Drs. R. Ottolengui and H. C. Brown be added to the committee, and that the committee be directed to request the presidents—or representatives to be appointed by him—of the various state associations, the Faculties Association, the Examiners Association, the Dental Educational Council, and the Dental Faculties Association of American Universities, to attend a conference to be called at the pleasure of the committee for the purpose of considering a constitution and by-laws for this association, and to report thereon at the next annual meeting."

It is our desire to carry out the spirit and letter of this resolution, and to that end we most respectfully solicit your active co-operation by requesting that you send a representative to assist in formulating a constitution and by-laws which will permit of the national becoming a more representative and useful association, with a decided increase of membership, and publishing a national dental journal. We suggest that you not only select a representative, but also an alternate who may take the place of the former if for any reasons he cannot attend.

Your society should be ably represented, and we trust that you will select one of your members who is familiar with your views upon this subject and more or less familiar

with the organization question generally. Since it would seemingly be impossible to adopt the views of every organization thus represented, we would therefore urge that you place confidence enough in your representative to authorize him, in the event that your specific instructions do not meet with the approval of the majority in attendance, to act and vote in accordance with his best judgment in order to bring about a final and satisfactory adjustment of this important question.

In order that all state societies may officially take action and give such instructions as they desire to their representatives, it has been necessary to arrange to hold this meeting in Cleveland, Ohio, commencing 9 A.M. Monday, July 24th.

Kindly send names of representative and alternate, together with copy of any resolution which you may pass, to the secretary of the Revision Committee.

Thanking you in advance for your co-operation, we remain,

Fraternally yours,

J. D. PATTERSON, *Chairman Revision Committee.*

F. O. HETRICK, *Chairman State and Local Society Committee.*

H. C. BROWN, *Secretary of above Committees.*

This letter has been or will be sent to each state society, and one of a little different form to the other organizations named therein.

Many organizations thus addressed may wish to give specific instructions to their representative, but in order to accomplish the best results each representative should be given additional authority to use his judgment in formulating a constitution and by-laws, in the event that such specific instructions as may be given do not meet with favor. This is the most important feature to be considered in this connection, since it can be readily seen how impossible it will be to reach an harmonious conclusion if all representatives, or one-half of them, were so limited in authority that they could carry out only definite instructions.

RESOLUTION OF THE OHIO DENTAL SOCIETY.

The Ohio Dental Society, at its annual meeting in December, adopted a resolution approving such a reorganization, and selected its representative and alternate. This resolution was necessarily long, inasmuch as the Revision Committee had not prepared its letter, and it contained more or less information embodied in our letter which was prepared later. I herewith quote that portion of the Ohio resolution which is so important, and which will render it possible to take some definite action:

And be it further

RESOLVED, That our representative shall first direct his efforts in accordance with the foregoing instructions, but in order to make possible an harmonious and successful termination of this long-discussed subject, he is authorized to act and vote as may in his judgment seem advisable in formulating a constitution and by-laws, which will permit of the National Dental Association reorganizing under a broad and equitable plan and publishing a national dental journal.

THE PROSPECT.

The representative of each state society and the other organizations designated will be accorded equal privileges, and any such organizations not accepting the opportunity to co-operate in this matter should accept the results of this conference, or at least refrain from finding faults with whatever may be done. "In a multitude of counselors there is wisdom," and if a decided majority agree upon some particular form of a constitution and by-laws, together with a plan of reorganization, then there would seemingly be little doubt about the National

Association adopting the report of the Revision Committee, when formulated in such a representative manner. When some such policy is outlined and adopted, it certainly should receive the most liberal support of all, and when receiving this support the National Dental Association will assume its rightful position in our profession.

Some may criticize this paper as being too idealistic and not practical, but in our practice we should, as nearly as possible, approach the ideal, and by ever keeping this conspicuously before us, we are the better fortified to labor for and secure that for which we are striving.

Discussion.

Dr. B. Holly Smith, Baltimore, Md. I do not oppose anything Dr. Brown has said except that I think he has presented a phase of co-operative action which is absurd. In the first place reorganization is not a pleasant word to me. When a business is put in the hands of a receiver, the people who are left with the dead body and bones of that organization, get together and reorganize it. The National Dental Association is a vital body, and by no means ready to go into the hands of a receiver. It was organized after great effort, not by the people of the North, South, East, or West. It was organized by *the* people, the dental profession of America. It was formed after great effort, and it has done a great work and needs no reorganization. The amendment of constitution and by-laws is always proper, and due provision is made for such changes. I think it would be perfectly proper to include in the activities of the National Association every local or state society, but it seems strange to me that from an almost extraneous source, a source practically out of the influence of this great organization, there should come the movement toward turning it upside down. In the first plan brought forward, the Southern Branch, which was as much a component part of the National as the American Dental Association, is practically wiped out and accorded no voice in national affairs. In organizing the National Association many of the influential men of this Southern Branch took part, and it is a shame that this should be overlooked. There are men who are thinking and accomplishing for dentistry in all state and local societies, and these societies should bear some relation to the greater and more representative body. So far I am in accord with the essayist's views.

I will say in closing that, if the reorganization of the National Association is attempted after all, it should be undertaken along the line I have suggested, by the affiliation of the state and local societies. In the American Medical Association, Dr. McCormick of Kentucky was employed with a salary to travel throughout the country and organize the local and state societies as component parts of the American Medical Association, and that is what we need. We cannot grow in a minute, like mushrooms, and our society has grown as fast as unassisted growth usually takes place. What we need is somebody to preach the gospel to the heathen, and that is practically all that is needed and that can be accomplished in this proposed reorganization of the National Dental Association.

Dr. W. C. Miller, Augusta, Ga. I feel incompetent to discuss this question, but I had the honor to offer the resolution referred to by Dr. Smith, as retiring officer of the Georgia State Society. I was fortunate in having residing in

my town the secretary-treasurer of the Georgia Medical Association, and before the meeting in Atlanta I had quite a conference with him in reference to the organization of the Medical Association. In these resolutions, which, I am proud to say, were unanimously adopted, we had incorporated the clause that the local and county societies must have membership in the state society. Through the state society the men would of course be eligible to membership in the National society, and it seems to me that we rehash these matters and accomplish nothing. The education of the public should be universal, and if we were organized like the Medical Association, we could have a common treasury and concentrate all our efforts in that direction. If the same effort were expended in Athens, Augusta, Savannah, and other towns as is being put forth here in Atlanta we should not only accomplish more for the public, but we should be better organized and do more scientific work, which would redound to our good and to the welfare of the public. It is a very true saying that "United we stand, divided we fall," and this applies especially to our case.

Dr. L. D. Carpenter, Atlanta, Ga. I want to say a word in corroboration of Dr. Smith's remarks. I was a delegate member when the National Association was organized. I had the honor of being president of the Southern Dental Association, and we very willingly gave up to the organization of the National Association. At that time I was vice-president of the American Dental Association, and we did not then think, nor do I now, that there is any need for reorganization, if all who are in the association would do their duty and induce others to join. The National Association is organized as firmly and as strongly as it can be, and much good will come from it as long as time shall last.

Dr. J. D. Patterson, Kansas City, Mo. Dr. Brown has been unfortunate in the wording of the title of his paper. He is not what may be called an insurgent, who wishes to turn things over entirely, as Dr. Smith says, and perhaps he has been unfortunate in using the word reorganization so much. Personally I know him to be in favor of revision of the rules and constitution for the purpose of making the National Association broader and recruiting a larger and better membership, so that it may be what we desire it to be.

The revision report which was drafted at Birmingham was not acted upon by the Council, but referred to the Denver meeting for adoption of that or any substitute, so that the committee could become better acquainted with the points at issue, and be enabled to go over the ground more thoroughly. When the question was brought up at Denver, a resolution was offered asking that all state societies send representatives to a conference to be held on this subject immediately preceding the coming meeting at Cleveland, and we expect at that conference to settle the matter for all time to come. Personally, I do not wish for anything more than revision. Having been a member of the old American Dental Association, the predecessor of the National, my heart goes out to that association, and when you speak of reorganization I say with Dr. Smith that I think it unnecessary. It seems to me that the by-laws of any intelligent body of men engaged in scientific research for the good of humanity and the relief of suffering depend upon the spirit of the men engaged in the work. After all, what we need is that enthusiasm for the

work and that spirit of union which Dr. Smith has spoken of. I am not in favor of reorganizing and casting aside all the safeguards that were thrown around the American and the National Associations in times past, but, if necessary, and if the majority so decrees, I will acquiesce, and work with the majority. This Southern Branch Association, because it is really the National Association, was not asked to send a representative to the meeting, but the committee would be more than glad to ask for such a representative. It was simply an oversight that representation from this association was not asked, and I wish to suggest that one of the members of the society make a motion that this body send a delegate and an alternate to that conference to be held the day before the National meeting, and I hope he will not favor reorganization but revision. The whole committee will surely be glad to have this society represented at that conference, and to hear its views.

Dr. G. H. Tignor, Atlanta, Ga. In furtherance of what Dr. Miller, as ex-president of the Georgia Society, has said, I want to state that we have responded to this proposal of closer relationship by complying with your request to appoint from the Georgia society an essayist and a clinician, Dr. Teague and Dr. Johnson being on the program as the result of the Georgia society's appointment. We have even gone a little farther, or rather, we are reciprocating their invitation by asking that some of the members and officers of the National Association come to our Georgia meeting on June 13th at Macon, read papers, and give clinics. We have already received an acceptance from one who will give us a clinic, and we hope that before the close of this meeting someone will volunteer to read us a paper. I want to take this occasion to invite you all to come to our Georgia meeting in June, and I am sure that you will find the same response as last year to the appeal for the co-operation of our society toward the establishment of a closer relationship. I like the word revision better than reorganization, and I trust that in the end we shall have the greatest dental association in the world.

Dr. R. H. Jones, Winston-Salem, N. C. I must confess that when I read the title of the paper I thought, like Dr. Smith and Dr. Patterson, that the word reorganization should not be used. After hearing the paper I am satisfied that the essayist does not really mean reorganization, but advocates that we should make an effort to get the local and state societies into closer touch with the National Association as component societies thereof. If we interpret the phraseology of the paper correctly, there is nothing to prejudice the older members of the National Association against the essayist's views.

The President. By way of explanation I would say that I am responsible for the use of the term reorganization in the title of the paper. I invited Dr. Brown to read a paper, naming that title, because this phrase is being commonly used with reference to the question of revision.

Dr. M. F. Finley, Washington, D. C. I would like to emphasize one point made by Dr. Smith. To my mind the important feature of this effort to enlarge the National Association is to extend our activities to the individual members of the profession. The gospel must be preached so that it will reach the individual. We have delegates in the National Association now, but we want to have more men attend the meetings, will-

ing to contribute of their time and to show an interest in the profession to which they have chosen to devote their lives. It does not mean much to belong to an association unless a member has interest enough to attend its meetings, and everyone who does attend the meetings realizes that the compensation is greater than the expenditure of time and money occasioned by attending.

The government of the United States appreciates this National Association, because its legislature has yielded to its request. The Agriculture department, through the bureau of chemistry, has yielded to the National Dental Association as it did to the American Medical Association, in making examinations of proprietary preparations. The United States Pharmacopeial Convention yielded to the request of the National Association because it is a representative body of delegates from every state in the Union. There is no question as to the willingness of every state society to join in the building-up of this association. It is the individual who holds back, and we must stir up the individual to appreciate his duty and his privilege.

Dr. Brown (closing the discussion). In closing this discussion I wish to state that I regret that many of you did not hear my explanation of the title of my paper, and that the president did not make his explanation sooner; for, as it is, you must appreciate the fact that he is shouldering the responsibility for naming this child. After it had been named, however, I proceeded throughout the paper to call it by the name by which it was christened. I did not like the name as suggested, and came very near requesting that it be renamed, but in accepting Southern hospitality, such as was extended to me by Dr. Smith, Dr. Chace, and others, I felt that I wanted to be agreeable, and respond in the same spirit by using the same form as designated in my invitation. Therefore the criticism of the title is hardly fair when you understand the conditions as now explained.

I have not tried to depreciate the good work done by men who have been very active in the profession and the National Association for many years—in fact, longer than I have been connected with it. They have done efficient work, but, on the other hand, we have arrived at a stage in our organization when there seems to be a demand from many sides for some changes at least. I am not responsible for this demand, but I am in sympathy with continuing the good work that has been done, and adopting such changes as will make our association a more representative one. Our present constitution is not wholly in keeping with what such a constitution should be, but I agree with the speaker who claims that it is not necessarily essential for it to be so definite in all its provisions, especially if the organization is enthusiastic or practically unanimous in its activities. Efficient work can be done with a modified constitution, but in view of many complications that may arise from different sections of the country, it would seem necessary that we outline a broad plan and clearly define the duties and responsibilities of all. I have purposely omitted outlining any policy, for, as a member of the Revision Committee, appointed without consultation on my part, I did not consider that proper at this time. I presume that I was appointed as a member of this committee at the instance of Dr. Smith, inasmuch as he particularly called my attention, as corresponding secretary, to the fact that I should get in close touch with the various

state organizations. If the secretaries of the Southern societies are here, I think they will bear me out in the statement that I took up a systematic correspondence with them, and I consider it quite necessary that we keep in close touch not only with the state but also with the local associations, and these local societies should practically be the unit of both the national and the state organizations.

I agree with what has been said with reference to the Southern Branch sending representatives to this conference. In my letter of acceptance to the president I called attention to the fact that this association seemed to have been overlooked, unless it was understood that Dr. Smith, being a member of the Southern Branch, was to look after its interests;—unless that was the case, I was in favor of the Southern Branch being extended an invitation to have representatives at this conference.

I do not believe it necessary to say anything further on this reorganization question, but I wish to emphasize one point. The important thing to be done in bringing about a revision, if we are to use this term, of the National Association, or a revision of the constitution and by-laws, is that each state society here represented shall assume its full responsibility and send a delegate to this convention. Your delegate will have the same consideration as any other delegate present. Like Dr. Patterson, I have my views, but I shall accept the wish of the majority at this conference. If these societies will send delegates, as requested in our letter, and as outlined in the resolution, the revising of our constitution and by-laws will be rendered possible in such a manner as ought to meet with the hearty approval and co-operation of all sections, and then we should eliminate this question which has been under general discussion for some time.

In connection with the Cleveland meeting, I might state that we hope to have the largest meeting the National Association has ever held. Great preparations are being made, and I am confident that we will have a large meeting. I understand that about three hundred clinics are expected, and I wish to extend to the members of the Southern Branch and to the members of the profession of the South a most cordial invitation to come to Cleveland for the National meeting in July.

Dr. B. Holly Smith. The suggestion of the chairman of the committee of the National Association, that the Southern Branch send one or several representatives to the council for the preparation of some revision of the constitution and by-laws appeals to me very favorably, and I move that we send a delegate, to be appointed by this association to confer as to the plan of revision of the constitution and by-laws of the National Association.

Dr. Brown. I understood that there is a committee in this society appointed to revise the present by-laws of the Southern Branch, and as they are more or less familiar with the work, I would suggest their appointment as delegates.

Dr. Smith. I would amend my motion to the effect that our Committee on Revision of By-laws be appointed as delegates to the conference in Cleveland.

The motion was carried.

Report of the Committee on President's Address.

The Committee on the President's address then presented its report as follows:

Your committee appointed to consider and report on the annual address of the president respectfully presents the following report:

Oral hygiene. It is the opinion of your committee that the strong manner in which the president has indorsed the work of the Oral Hygiene Committee is all that could be said, and we heartily indorse his words and sentiments.

We recommend that a resolution be passed commending the Public Health Bill in Congress, the same to be sent to Senator Owen of Oklahoma, together with a letter of thanks from this association for his efforts in behalf of this measure.

Place and time of holding meetings. We heartily indorse the president's idea of meeting in large and centrally located cities, for the reasons which he has so forcibly laid down in his address, namely, railroad facilities and hotel accommodations.

As to the time of meeting, we believe that question should be left, as at present, with the Executive Committee, but we would suggest that hereafter this committee select the time of the next meeting as early after each annual convention as possible, so as not to conflict with other important meetings, keeping in mind the climatic conditions of the city selected as to the time of year for such meeting.

Revision of constitution and by-laws of the National Dental Association. We heartily indorse the suggestion of the president as to allowing state associations to become component parts of that branch of the National Association in whose territory said state may be.

We further indorse the suggestion that the proceedings of the state associations be published in the journal to be maintained by the National Association.

As to what portion of the annual dues should be contributed to the National Association for such work, your committee would prefer to hear this subject discussed by this body before making a suggestion on so important a matter.

Miller memorial. We feel that the suggestion of Dr. Truman W. Brophy of Chicago, that a fund be raised for scientific research, entitled the "Miller Memorial Fund," the interest of which shall be expended annually for original investigation, will be a more permanent memorial to Dr. Miller than any monument would be.

We would also suggest that appropriate resolutions be passed expressing our sorrow over the death of Dr. J. P. Gray, and that said resolutions be spread upon the minutes of this association.

Respectfully submitted,

B. HOLLY SMITH, *Chairman,*
FRANK HOLLAND,
S. P. SHARP,
Committee.

Motion was made that the report be adopted.

Dr. SMITH. As a member of that committee I would like to call attention to the recommendation setting aside an hour as a memorial to the late Dr. J. P. Gray, and would amend the report by adding that appropriate resolutions be presented.

The report on the President's address was adopted as amended.

The Executive Committee then presented the following resolution:

It having been brought to the attention of the Executive Committee that at nearly every meeting of the association there appear on the program the names of a few practicing dentists whose affiliation with the profession is not regular, the committee desires to call the attention of the members to the necessity of using extreme care in accepting contributions to the program, and to secure exact information as to the status of anyone making such contributions; and the committee, in order to still further protect this association against any impositions of this kind have passed the following resolution:

RESOLVED, That it is the belief of this committee that, unless some extraordinary condition arises, no contributions to the program of any meeting of the association should be accepted from anyone who is not a member of his state association, and that contri-

butions from all such who, through a lack of care on the part of those soliciting contributions, may be placed on the program will be excluded from the program and the published proceedings.

The resolution was on motion adopted.

The next order of business as announced by the President was the reading of a paper by Dr. H. B. TILESTON, Louisville, Ky., entitled "The Care of the Mouths and Teeth of Little Children," as follows:

The Care of the Mouths and Teeth of Little Children.

By H. B. TILESTON, M.D., D.D.S., Louisville, Ky.

MUCH has been said and written concerning the care of the permanent teeth, and recently the dental press has teemed with articles on oral hygiene until the reader almost grows weary of a very good thing.

Not overmuch has been said lately, however, about the care of the mouth and teeth of little children; by that I mean very little children, in whose mouths are only deciduous teeth, or in whom no teeth have as yet made their appearance. I even have in mind, and purpose to speak of the care *for* rather than *of* the teeth, of children unborn.

CARE OF TOOTH DEVELOPMENT IN THE UNBORN CHILD.

If it may truthfully be said, as someone has suggested, that the education of a child should begin with its grandmother, it is certainly no less true, and far more easily demonstrated, that a prudent care for a child's teeth should begin with its mother, and some time previous to its birth.

When it is remembered that the calcification of the teeth of the primary dentition begins at the seventeenth or eighteenth week in the embryo, and that, at birth, the crowns, *i.e.* that portion of the teeth which will later be subject to the attacks of caries, are practically completed, it will be readily appreciated that it is quite possible for certain influences to make or mar the perfection of the deciduous teeth during the period of gestation. They may be atrophied in their development, particularly the enamel, by a syphilitic taint in either parent, by tuberculosis of the mother, or by an attack of some exanthematous disease during the period of activity of the ameloblasts, or by any illness tending to interrupt the growth of enamel, and by insufficient or improper diet during that time.

CONCERNING DIET DURING PREGNANCY.

The question of diet is the most important one to consider in this connection, because it is potentially within the control of the prospective mother. In some instances a diet not calculated to supply the needs of a growing tooth is indulged in through ignorance, or possibly from necessity, but it is also undoubtedly true that in many cases the dietary is intentionally perverted under the impression, probably largely based upon superstition—though quite likely not altogether so—that, in order to escape difficult and painful parturition, all bone-forming foods must be avoided. Thus it happens that many pregnant women refrain from eat-

ing bread and cereals, such foods as would supply the phosphates necessary to the growth of the bones and of the teeth of the developing fetus.

After the child is born the bones may recover from such impoverishment through the nutrient channels of the babe itself, but at birth the enamel of the deciduous teeth, with the exception of about the gingival third of the second molars, is finished, and the ameloblasts having disappeared, there is no possible chance for any imperfections of development then existing to be remedied.

When these teeth finally make their appearance, inadequately protected by the failure of the calcification centers of the enamel caps to coalesce in the sulci of the molars and at points upon the incisors and canines, it is not surprising that they fall early victims to the ravages of caries.

If this condition is properly referable to incorrect feeding on the part of the mother, it would seem the part of wisdom, in the interest of the future usefulness of the teeth of the infant and their conservation, that some educational work should be undertaken by both the family dentist and the physician to teach mothers what they should eat during the period of gestation in order to supply the essential elements of the developing teeth. Not that they should be encouraged to partake of an undue amount of bone-forming ingesta with the ambition to produce superlative teeth, but that the regimen might be normal as nearly as possible, without thought either of depriving the fetus of calcium phosphate and carbonate or of giving it an excessive supply of these salts.

ADMINISTRATION OF MILK OF MAGNESIA INJURIOUS.

Another possible cause of imperfect calcification of the teeth, both of the deciduous and permanent set, is suggested by a recent publication from the pen of Dr. John Aulde, a physician of Philadelphia, Pa., in which he claims to have observed, in the administration of large and frequent doses of the milk of magnesia, that the magnesium will substitute itself for the calcium in the bones.

This element is prescribed freely by physicians as a corrective in cases of acid excreta by the kidneys, the skin, and the bowels, or for acid vomiting, and is used *ad libitum* as a home remedy for sour stomach and as an aperient. Dr. Philip F. Barbour of Louisville, an eminent specialist in children's diseases, called my attention to it, and suggested that such substitution might have some effect upon the teeth. He said he had frequently administered it to children and to pregnant women in conditions which he termed "acid storms," when all the excretions were for a time acid, and that since reading Dr. Aulde's article he had made observations which appeared to verify the claims he advanced.

The chalky white atrophic spot so often seen in the enamel of both the deciduous and permanent teeth and the areas devoid of enamel might be accounted for quite reasonably in this manner. If Dr. Aulde's claims are substantiated by further observation, greater circumspection in the use of this apparently harmless substance will be called for.

DIET AND CARE AFTER BIRTH OF THE CHILD.

The moment the child is born it becomes an independent entity as far as its nutrient economy is concerned, and its diet must be looked after either through the food of the mother, if she nurses the child, or by the careful selection of food given directly to it. But then the concern

is no longer for the deciduous teeth, but for the permanent ones, which have already begun to calcify, and in which enamel formation will continue for eight years. It is during this period that eruptive diseases are apt to leave their mark upon the enamel, and every dentist has observed the effects of measles or scarlet fever in the markings left upon that tissue.

The teeth have generally been classed as dermal tissues, as distinguished from the osseous, but the enamel, which is developed from the epithelial layer of the blastoderm, is the only part of the tooth which may properly be looked upon as being an appendage of the skin, and it is that portion which is affected by skin diseases when they occur during the period of amelification. It is during this period, also, that the effects upon the enamel might be expected to occur from the administration of magnesia referred to above.

LANCING OF THE GUMS.

The operation of lancing the gums in cases of morbid primary dentition was formerly much more generally practiced than it is now. At one time almost every systemic disturbance occurring in the infant between the ages of six months and two years was conveniently attributed by medical practitioners to the process of "teething," and gum lancing as a remedy was indiscriminately resorted to both by physicians and dental specialists.

With the acquirement of more thorough and complete knowledge of infant pathology the pendulum has swung to the other extreme, and at the present time most physicians attach very small importance to difficult dentition as a factor in infantile pathemata. As a consequence, gum-lancing is just now quite out of fashion. Nevertheless, conditions frequently present in cases of retarded eruption of the deciduous teeth which seem to render this operation imperative, and gum-lancing, therefore, ought not to be relegated to the obsolete.

An intelligent appreciation of the conditions as they exist about an erupting tooth within the jaw, the overlying elastic gum tissue forcing the tooth with its circular knife-like incomplete root back upon the highly vascular tissues about its apex, together with the inflamed and sensitive state of the gum itself, suggests at once the use of the lancet to release the imprisoned tooth. The complete relaxation which follows, an infant on the verge of convulsions falling into a peaceful sleep or comfortably resuming its play, affords ample justification for the operation.

CARE OF THE TEETH AFTER ERUPTION. UNTOWARD EFFECTS OF SUGAR AND STARCH.

When the teeth finally make their appearance, then not only the diet of the child but its habits of mastication and oral hygiene are to be regulated, looking not so much to the development, at least of the deciduous teeth, as to their preservation and proper function.

The question of diet is to be considered in its relations to both tooth development and preservation of the teeth. The milk from a well-nourished mother is conceded to be the food best adapted to supply all the needs of a growing infant. While artificial foods may be sufficiently nourishing, they are almost invariably so excessively charged with sugar that the teeth, after their eruption, if such foods are continued, are sure to suffer, unless extraordinary precautions as to oral prophylaxis are employed.

Dr. M. Evangeline Jordon of Los Angeles, Cal., in a paper read at the meeting of the National Dental Association in Denver, calls attention to the injury almost invariably inflicted upon the teeth of little children by the use of condensed milk, and cites several cases from practice showing excessive damage from this cause.

The use of sweetened infant foods cultivates a taste for sweets, and the child, as it grows older, develops the proverbial "sugar tooth," a craving for candies and cakes, for syrups and dainty tidbits that exclude from the diet the more nourishing foods, much to the injury of general health and the teeth.

Foods containing sugar are not necessarily destructive to the teeth. It is only when the sugar is allowed to remain upon and between them until changed by the bacteria thriving upon it into lactic acid, that the teeth suffer from caries. Foods containing starch, which is changed to grape sugar, a glucose, in the mouth, are just as bad for the teeth, and farinaceous substances are necessarily a part of every mixed dietary. Sugar in the form of confections is worse only because it is eaten at all times, with meals and between them. No direct harm would be done to the teeth in any case if the mouth could be thoroughly cleansed of all traces of sugar or starch immediately after partaking of them; a difficult thing to do when the habit of eating candy is indulged in continuously. For this reason children should be denied the use of candy at all times, and be permitted only a limited quantity of sweets with meals, after which the teeth should be cleansed by the mother or nurse, and, as soon as feasible, by the child itself.

The eruption of the very first deciduous tooth proclaims the time for the beginning of prophylaxis. The prudent mother will care for that little tooth, and clean it and polish it like the precious jewel that it is, and, as others appear, the field of operation will widen until it includes the entire galaxy of gems. A child is as susceptible to the delicious sensation of oral cleanliness as older people are, and if the teeth are kept clean during the time when that duty must be performed by the mother, the work will be continued by the child as soon as it is old enough, and the habit thus begun will continue throughout life. Given a set of teeth free from congenital imperfections, such care as this will certainly preserve them until they are exfoliated to make room for their successors.

Recently I had the pleasure of viewing in the mouth of a little boy four years old a set of teeth so beautiful and perfect that I took impressions of them and made these casts [demonstrating]. Every tooth in both dentures is absolutely free from spot or blemish of any kind. This child has never tasted candy, and his mother and his aunt began cleaning and polishing his teeth as soon as the first incisor appeared, with this most gratifying result.

But alas, few mothers have either the inclination or the slightest conception of its importance to impel them to perform such service for their little ones, and as a consequence the first view that the dentist has of the majority of the mouths of little children brought to him, usually for the relief of pain, is not only discouraging but disgusting. In a large proportion of instances the parents have never dreamed of such a thing as cleaning their child's teeth.

Most parents, some dentists, and many physicians look upon any special care of or solicitude for deciduous teeth as all but

useless, since, in their opinion, they are to last but a little while anyhow. There is a widespread and utter lack of appreciation of the purposes of the primary set of teeth or of the beautiful arrangement in nature whereby the growing child is provided with a continuous masticating apparatus. Since the teeth themselves cannot increase in size to keep pace with the growing maxillæ, a small set is gradually superseded by a larger and stronger one suited to the larger and stronger jaws, and the deciduous teeth are intended to perform all the functions of their permanent successors until displaced by the latter. If the deciduous teeth are preserved in all their integrity, this process of replacement goes on smoothly; but if any are prematurely lost or their approximal contact is destroyed by caries, or if abscesses are allowed to form from putrescent pulps, then all goes wrong.

THE DENTIST'S PROBLEM.

Fully cognizant of the crying need for operative services in the mouths of little children who are entrusted to his care, and as fully aware also of the difficulties attending such service, sometimes almost or quite insurmountable, the dentist is confronted with a serious problem, and he asks himself the question, What shall I do about it? If he fails to direct the attention of the parents to a need he knows to exist in their child's mouth, he shirks a known duty; and if he makes a conscientious effort to impress the parents with the importance of caring for such conditions he knows he will be called upon to do it, and in many instances he would prefer not to undertake it. Children who have been spoiled at home or have been taught to look upon a visit to the dentist as a fearful thing are usually hopeless as patients, and after having spent a fruitless hour with such a child, the dentist may be pardoned if he fervently hopes never to see that youngster again, and feels that he must hie himself away with his golf clubs and have a foursome or a lonesome, and forget his troubles.

Fortunately such extreme cases are comparatively rare, and will become less frequent as the parents, through the advice and instruction of the family dentist, train their children to value their teeth, and to look upon the dentist as a friend and not a monster to be dreaded. The solution of the problem lies in getting hold of the little ones so early that there is nothing to be done that will cause pain, and then so guarding their development, by frequent visits to the office, together with proper care at home, that no occasion will ever arise for the infliction of any great amount of pain.

While some cases in every practice may be treated in this manner, and while their number may be confidently expected to increase, there still occur numerous cases where the destruction of the teeth has progressed to a point which all but prohibits any hope of success in the attempt to save them. The complaint is made that the fees obtainable for such service are not commensurate with the time and skill required, not to mention the wear and tear on the nerves and the patience of the operator.

The question which presents itself frequently in a practice among a good class of people, such as most ethical dentists enjoy, is not, What shall I do for poor children's teeth? but, What shall I do for the teeth of children whose parents are willing and anxious to have done whatever I advise, and who are able to pay for it? When it is explained to such parents that the contemplated serv-

ice, together with the time and skill required to perform it, is worth more to the future of the child than the same amount of care devoted to it later in life will be, they will usually be perfectly willing to pay a satisfactory fee. It is then "up to the dentist," and quite often the *what* and the *how* constitute another difficult problem. The conscientious practitioner will want to do many things that he cannot do, and will have to be content to do the best he can under the circumstances, realizing that frequently that best is a very poor thing indeed.

AMUSING CHILDREN.

Many suggestions have been made and devices offered for the amusement of children in the dental chair. In children who are shy and timid some means must be adopted to reassure them and gain their confidence before anything can be accomplished, but in my opinion the efforts to amuse them may easily be carried too far, especially with forward, wilful children who are quite willing to be amused, but are for all that no more ready to submit to the real object of their visit than before; in fact, they rather prefer that the dentist should continue to amuse them.

Objection has been made to the paraphernalia surrounding the modern dental chair as calculated to inspire fear and dread in a child. Intelligent children are usually of an inquiring turn of mind, and a tactful dentist can readily interest them in his various appliances, and in order to illustrate their use will presently be actually using them on the little patient. I think more can be accomplished with little children by a kind, gentle and sympathetic attitude, together with enough firmness and not-too-severe dignity to command their respect, than by any effort to amuse them which may encourage familiarity to the extent of breeding contempt for the real purpose of their visit as well as for the dentist.

THE USE OF ARSENOUS OXID IN DECIDUOUS TEETH.

It was my original purpose in presenting this paper to devote it largely to the consideration of operative procedures on deciduous teeth, but the topics discussed so far have extended this essay to such a length that I will not attempt, at this time, to take up the details of practice in the treatment of the various conditions met with in the mouths of little children.

There is one topic, however, I would speak of in this connection, namely, the use of arsenic in the deciduous teeth. Dr. Jordon, in the paper mentioned above, advocates the use of arsenous oxid for devitalizing exposed pulps in deciduous teeth, and reports very favorable results following such practice. In the course of the discussion of her paper considerable opposition to such use of arsenic was manifest.

Arsenic is a drug which seems to have a peculiar selective effect upon the dental pulp, and a quantity so minute as to be almost inappreciable is sufficient to destroy the vitality of even an adult tooth pulp. When used with discretion, I see no reason why it should not be safely employed in little children's teeth. The danger lies in applying too large an amount of the drug, or in leaving it in contact with the pulp too long; hence, if it is used in deciduous teeth at all, it must be applied with extreme care and with the assurance that the child will be seen again within twenty-four hours.

NEGLECT OF THE DECIDUOUS TEETH DUE TO IGNORANCE.

If parents, though educated and cultured, have been indifferent to the care of the mouths and teeth of their little ones,

if they have neglected to consult the dentist until the deciduous teeth have become almost hopelessly involved, and the child is suffering pain that might have been avoided; if they have failed to appreciate the value of sound teeth for the general welfare of their child, and if they do not realize that any effort and expense necessary to save the deciduous teeth is worth while, it is all due to ignorance.

But all this is to be changed. The educational propaganda on the subject of oral hygiene which is sweeping the civilized world is surely destined to bring about a new order of things, and if every dentist faithfully and earnestly does his part, if he is not recreant to his most sacred professional obligation to patiently instruct all who come under his care, both the old and the young, in the care of these priceless organs, which are designed for a certain useful purpose and are intended to endure and not to be prematurely crippled or lost, then soon ignorance will be no more, human life will be made happier, healthier, and longer, and all mankind will rise up and call the dentist blessed.

Discussion.

Dr. W. C. Miller, Augusta, Ga. The paper is an excellent one, and having been fortunate enough to read and reread it, I will dwell on a few points that I have noted.

My attention was particularly attracted to the essayist's remarks in regard to controlling the diet of a pregnant woman. That, in my opinion, is one of the greatest difficulties which we have to contend with, and which I do not believe it is possible to overcome. We may, in some cases and to some extent, control our women patients' diet after parturition, but during the period of gestation I think it is absolutely impossible. We all have seen the lack of attention in this respect on the part of the family physician. We have frequently been met on the street by the husband of some woman patient with the remark: "Doctor, my wife will be down to see you soon; we have a young baby at home, and nearly all her fillings have fallen out." When we ask if the physician has prescribed any mouth-wash during the period of gestation, the answer is, "No, none at all." This is a point that should be impressed upon the family physician. We realize the importance of oral prophylaxis, but we are not in as close touch with the family as is the physician.

The essayist speaks of the substitution of magnesia for lime during the development of the teeth, which deserves our careful consideration. How many of us during our school years have been taught to use magnesia during this critical period! I have in my family, I am sorry to say, evidence of this injudicious advice—*i.e.* lack of lime salts in my children's teeth, which I feel as a reflection on myself, and I dislike to have these children go out among people and be pointed out as the children of a dentist. I have used all possible precautions, and whether magnesia has been substituted for lime or whether they did not receive proper nourishment, I am not prepared to say, but something is lacking, and I much fear that in the permanent set I will have the same trouble to contend with as in the deciduous set. I may add that both of my children were bottle-fed.

I believe in lancing the gums, and shall until I am convinced that it is wrong. The essayist impressed us with the importance of the child's first visit to the dentist. Usually a child is presented suffering with its teeth and with a swollen jaw, and the first word from the parent is,

"Doctor, you must do something for the child; we cannot sleep at home." The parents seem to put more stress on their own comfort than on that of the child. They fail to realize the little one's suffering and are more concerned about their being disturbed at night than about the condition of the child. There, in my opinion, we have a wide field for education.

I do not use arsenic in deciduous teeth, but pressure anesthesia. After securing the child's confidence, usually sufficient pressure can be produced simply by the closing of the jaws.

Dr. J. P. CORLEY, Greensboro, Ala. I would like to have a half-hour to discuss this paper, which is one of the most praiseworthy that I have ever heard, but in view of the lack of time I will only touch upon one feature which, I think, is the greatest problem that confronts us today, namely, the education of the mother. In order to reach the children before any damage is done to their teeth, we should equip our offices with an educational exhibit. The exhibit which you see before you is very incomplete, but it has some important educational features.

Let us not be bound by traditions of the dead past in regard to advertising methods which would be educational and would convince the mothers of the necessity of attention to the child at an early age. I have here models [demonstrating] which represent the mouth at the ages of three, five, seven, nine, eleven, thirteen, and seventeen. Here is a model of the mouth of an eleven-year-old child, which shows a deformity in consequence of the loss of the permanent molars. There are eight models in this series, showing the effects of extraction at different ages. In connection with these models I show pictures of a profile, bringing out the deformity produced in the face, a deflection of the nasal septum and stenosis, also protrusion of the teeth. We can show the effects of negligence to the layman much better on models than by telling him. I also take up the technique of the dental toilet. This collection shows all the necessary equipment for scraping and scouring the mouth, and keeping it clean. In regard to orthodontia, I have models showing the distortion of the face, the loss of masticating surfaces, etc. We ought also to have an orthodontic appliance and explain the principles upon which it works. Some of our best orthodontists use fixed appliances, which render it impossible to keep the mouth clean. Let us, instead, make removable appliances which the patient can remove in order to eat in comfort, and replace after eating. I show here a case [demonstrating] in which within eight months a perfect condition of symmetry was produced —an expansion of a quarter of an inch in the arch, and the establishment of perfect occlusion. This patient never ate with that appliance in the mouth.

We should also have models showing the effects of tartar on the teeth, and explain to them the so-called Riggs' disease. We ought also to have all kinds of toothbrushes to suit mouths of all shapes, and we should require the patients to have the proper equipment, get it for them, if necessary, and require them to use it. We should instruct them in the use of the mouth-mirror, and should show them, by practical demonstration, how to brush their teeth. By having these models in our offices, we can show the patients the difference between cross-brushing and brushing lengthwise. We should tell them that if they will not get the proper outfit, and use it, they will have to secure the services of another dentist.

Dr. TILESTON (closing the discussion). I appreciate the difficulties of the situation, and I am not at all sensitive about not having my paper more fully discussed. This subject is one that you should look up later and think over.

Dr. Miller spoke of the control of the diet of the mother previous to the birth of a child. The dentist has not much opportunity personally to direct the diet, but he can by closer association with the family physician exert some influence in this direction.

Dr. BRABSON then presented the following resolution, which was on motion adopted by the society:

Inasmuch as the time heretofore set apart for the work of this association is always too short, being limited to three days, thereby rushing through business that should be carefully considered in session, therefore be it

RESOLVED, That the time be extended to four days hereafter.

Dr. T. P. HINMAN, Atlanta. I wish to make the members acquainted with the unfortunate condition of an esteemed member of our profession, namely, Dr. A. H. Thompson of Topeka, Kans. Dr. Thompson has been so unfortunate as to become paralyzed and incapacitated for the practice of his profession. His invaluable scientific work in comparative odontology is well known to all, and his life has been devoted to the upbuilding of dentistry.

The next order of business was the reading of a paper by Dr. N. C. LEONARD, Nashville, Tenn., entitled "Surgery of the Pulp, and Its Relation to Periapical Infection," as follows:

Surgery of the Pulp, and Its Relation to Periapical Infection.

By N. C. LEONARD, D.D.S., Nashville, Tenn.

A CASUAL examination of current dental literature would indicate that there is still a very considerable proportion of practitioners, as well as teachers, who in a large percentage of cases demanding pulp removal adhere to the use of devitalizing agents. While it seems to be generally admitted that the surgical method is preferable in suitable cases, the selection seeming to fall usually on those cases that are easiest, we are left to infer that the old method is still held in high regard in the minds of the majority.

ATTITUDE OF THE PROFESSION TOWARD LOCAL ANESTHESIA AND EXTIRPATION OF THE PULP.

The attitude of the profession toward the newer method has not at any time since its introduction appeared to be so much one of skepticism and distrust, as one of timidity toward a method that is believed to make larger demands on the skill of the operator.

The surgical removal of the living pulp under local anesthesia, with proper aseptic precautions, followed by the introduction of a suitable root-canal filling, has been accepted without question as a scientific procedure. The difficulties and uncertainties attending this operation and its results are questions about which there still exist important differences of opinion. Certainly the subject is of sufficient importance to merit the best attention of the profession; and it is with the hope of eliminating some of the errors that have crept into the minds of the

timid as to the difficulties involved in this method, of modifying the belief as to the uncertainties of result, and of establishing a better technique for this operation, that the writer feels justified in presenting this paper.

Extirpation of the pulp is certainly more in accord with modern surgical principles than the method requiring the use of devitalizing agents, and no part of medical science has a firmer foundation than these principles.

THE STAGES OF SURGICAL PULP EXTIRPATION.

The surgical method as generally employed may be, for convenience of discussion, divided into four stages, viz, cleansing and sterilizing the cavity, anesthetizing the pulp, removing the pulp, and filling the canal. It would now be easy to give classical advice covering these points: Thoroughly cleanse and sterilize the cavity and the point of exposure; anesthetize and remove carefully from each canal every vestige of the pulp to the apex of the root, making sure that no septic matter has been forced beyond; arrest hemorrhage if there be any, cauterizing the stump to prevent recurrence, flood the canals with a bland but efficient disinfectant; dry thoroughly and fill quickly and exactly to the apex with a non-irritating and permanently aseptic and antiseptic non-shrinkable and stable material. These directions, if it were possible to follow them in every case, would secure perfect results, but they are ideal, and probably not possible of accomplishment in a very large percentage of cases.

COMPLICATIONS.

The variableness of conditions under which we work, the temperament of the patient, and the varying anatomical arrangements and environment, must modify to a considerable degree the success of the most careful and painstaking effort to approach the ideal in each stage of the operation.

While we should keep in mind through the successive steps the ideal to which we would attain, using every available effort toward thoroughness, we should also be ready to recognize the limitations beyond which professional valor should yield to discretion, and make such compromise only as may be reasonably compensated by other details of the operation, or such as nature can be safely relied upon to correct.

STERILIZATION OF CAVITY AND PULP EXPOSURE.

To illustrate I may say in regard to the first stage of the operation that it is seldom possible, or to say the least, practicable, to perfectly sterilize the cavity and the point of exposure of the pulp; nor is it always possible to remove all the pulp tissue, whether septic or sterile. In these cases some compensating measure must be instituted to safeguard the periapical tissues, if possible, from septic invasion. In our ability to do this lies much of the future safety and utility of pulpless teeth. These compensating measures, of course, should always be secondary to thoroughness in each step, though, as a precaution, they should be an adjunct to every operation of extirpation.

The outline of technique that has proved satisfactory to the writer in its exclusive use for about fifteen years will serve to emphasize these points, and will also furnish a more definite basis for a profitable discussion.

After the cavity of exposure has been cleansed of débris, isolated, and dried, it

should be flooded with a suitable disinfectant to sterilize the walls and exposed surface of the pulp. The cavity is again wiped out and dried, when it is ready for the application of the anesthetic.

PRESSURE ANESTHESIA.

In this next step the operator usually has opportunity to display considerable skill and dexterity. To produce anesthesia by pressure, the agent should be well confined directly against the pulp exposure. By the use of soft yellow wax, pressed into place with slightly moistened pellets of cotton held in the pliers, any cavity may be shaped to a form convenient for successfully applying this method of inducing anesthesia—barricading, for instance, the interdental space by building in the soft wax, and converting a difficult approximal cavity on the distal surface of a molar into a simple cone-shaped cavity with the pulp exposure at its apex; or, by applying to approximal cavities a metal matrix that has been covered with melted soft wax. As an anesthetic agent I use the cocain-adrenalin tablets or pellets put up by Parke, Davis & Co., about one-sixth of a grain of cocain to each tablet. By moistening a small pellet of cotton held in the pliers and touching it to the cocain and adrenalin, the anesthetic is easily conveyed to the cavity and placed in the form of a thick paste directly upon the exposure, allowing the cotton to remain to prevent displacement. A pellet of yellow wax—not soft vulcanite—is then placed in the cavity in such a way as to confine the semi-fluid cocain directly against the pulp, and at the same time to exclude air-bubbles that might displace the anesthetic. Then by slight pressure on the wax, either with the finger or with a pellet of cotton held in the pliers, the pulp is almost instantly anesthetized. If the cocain is allowed to remain in contact with the pulp for a few minutes before it is subjected to pressure, the anesthesia is usually accomplished without pain.

REFRACTORY AND PARTIALLY DEVITALIZED PULPS.

If the anesthesia is not complete in each branch of the pulp, it may be supplemented at any stage of the operation by additional applications in the same manner. I use this method in all cases demanding removal of vital pulps, from the third molar forward, and without regard to the location of the cavity. Pressure anesthesia can be successfully applied, in my opinion, in any cavity where devitalizing agents can be applied, and in some cases where it would be impracticable to use the latter. Partially devitalized pulps, in my own experience, have been the most difficult to anesthetize, though occasionally a pulp-stone will cause an obstinate complication, which may be a severe tax on the operator's patience and ingenuity. It is not infrequently necessary in cases of partially devitalized pulps, where the dead tissue acts as a valve, preventing the passage of the anesthetic, to work in the agent gradually with a nerve broach slipped between the pulp and the wall of the canal, until the living tissue is reached. The question of apical infection is one, of course, that must be kept in mind from the beginning to the end of the operation, and such prophylactic measures as are available should be employed.

Likelihood of periapical infection. Fortunately, as we are operating on an organ that is isolated and surrounded by dense bony walls and where the most powerful disinfectants can be freely applied to the entire field of operation, a reasonably careful technique is less haz-

ardous than it would otherwise be. While the cavity at the beginning of the operation may be intensely septic, and the exposed pulp may be infected, the direct action of strong and penetrating disinfectants held for a few minutes in the cavity, and frequently applied during the operation, will compensate for a technique that might be much more careful and exacting in other directions. Theoretically, it would seem quite possible to force, with the anesthetic, septic material from an ulcer in the pulp beyond the end of the root into the periapical tissues, and yet my own clinical experience would indicate that with a reasonably careful technique, this is a very remote possibility. If the pulp tissue is immediately removed and the canals are flooded at the same time with an efficient disinfectant, it is reasonable to suppose that any septic matter that may have found its way into the canals will be rendered innocuous.

EXTIRPATION OF THE PULP.

After the pulp has been anesthetized, the cavity is again flooded with the antiseptic, and with a sterile bur the pulp chamber is drilled out and enlarged, so that free entrance may be had to the root-canals.

For removing the pulp from the roots, barbed broaches, one of suitable size for each canal, should be selected and adjusted to as many holders, taking care to sterilize them thoroughly. A broach is then introduced into its respective canal and deftly worked to the apex, which can usually be determined through a delicate sense of touch by a suddenly increased resistance; then, while the handle of the broach is being held in position with one hand, a drop of the fluid disinfectant with which the canal is to be flooded is placed with the pliers against the broach where it enters the canal. The broach is then to be slightly rotated to break loose the pulp at the apex, and as it is slowly withdrawn, the antiseptic agent, which has already been partially carried in by capillary attraction, is forced by air-pressure to fill the vacuum created by the removal of the broach and pulp tissue. This is perhaps the surest way of flooding the canals with the antiseptic, as it practically prevents the invasion of air-bubbles that would interfere with the flooding subsequently.

In broad flat canals two broaches may often be used to advantage at the same time in removing the pulp tissue. We find teeth, of course, with such constricted canals that it is practically impossible to remove from them all of the contents. But the difficulty in these cases would not be obviated by the use of devitalizing agents; and in my opinion it is safer to leave these filaments in a sterile condition and risk their gradual degeneration than to leave them in what we know to be a septic condition. Nature is wonderfully resourceful in taking care of impaired tissue that has not been subjected to outward septic influence.

IMMEDIATE ROOT-CANAL FILLING.

Having had no reason for changing my views, and desiring particularly to emphasize the same points, I may be pardoned for quoting freely from my own essay on the same subject read before the National Dental Association five years ago in this city:*

> When the pulp has been removed, my invariable rule is immediate filling of the canals, and this I consider the greatest safe-

* See *Dental Cosmos*, May 1907, p. 505: "'Pressure Anesthesia' and the Removal of Living Pulps."

guard against periapical infection. If all reasonable aseptic precautions have been observed in removing the pulp, I cannot believe that there could be a more favorable time for filling the canals than immediately after the extirpation, while we have the greatest possible assurance that they are sterile. To delay this part of the operation for a subsequent sitting would be but to double or treble the chances of infection without offering any compensating advantage, and would deprive us of the use of the best means at our disposal to combat and render innocuous any septic or infectious material that may have been introduced into the canals during the operation.

Certainly no progressive surgeon, after performing an aseptic operation for appendicitis, could be excused for leaving the wound open for subsequent examination to see if everything is all right. He removes the appendix, ligates the stump, manipulates the tissues as little as possible, and closes the wound permanently with an aseptic dressing, which he does not expect to remove till the wound has healed.

The proper filling of the root-canals after the extirpation of the pulp is simply the application of a suitable and permanent surgical dressing for the protection of the living tissue at the end of the root, and is efficient in proportion as the filling is aseptic, antiseptic, non-irritating, and stable.

As a result of extirpation of the pulp there is often considerable and persistent hemorrhage, and the presence of this condition is urged by our authorities as a positive indication against immediate root-filling. To me, their reasoning appears illogical. The very best device possible for controlling hemorrhage is mechanical means, and I can see no reasonable objection to the immediate introduction of a permanent root-filling for this purpose, if the hemorrnage is persistent. Assuming that the operation so far has been done with due regard to cleanliness and asepsis, there should be nothing to fear if we stop the flow of blood with an antiseptic and non-irritating dressing placed in contact with the bleeding stump.

The blood itself is sterile, and if we observe the same precautions in the preparation and introduction of the filling materials as were observed during the extirpation of the organ, there could certainly be no more reason to fear infection than if the hemorrhage had not occurred. If there be danger from a clot in the apical region, then there would be less danger with the root filled, for the reasons that there would be less space for a clot, and the chief avenue of infection would be shut off by the filling.

I cannot conceive of a surgical operation of any kind being completed without leaving a certain amount of free blood to coagulate in the wound; but in the case just mentioned the amount of free blood left would be inconsiderable and insignificant as compared with that left by the most careful operator in an abdominal section, where the wound is immediately closed and permanently sealed with the assurance—in non-septic cases—that if no infectious material has been introduced by the operator, the free blood will not affect his results.

If persistent hemorrhage through the canal after extirpation should deter the operator from immediate filling, the clot that would surely be present at a subsequent sitting would be a much more serious menace to a successful result, in my opinion, than the presence of hemorrhage in the first instance. With the root-canals properly filled, the chances of secondary hemorrhage, against which we have been repeatedly warned, does not seem to me to deserve serious consideration.

As a root-filling material for this class of cases, that which I have adopted—and which seems to meet the requirements—is a paste made by mixing two parts of a coarse cement powder and one part of aristol with oil of cinnamon or any other essential oil or antiseptic agent. This can be introduced with smooth broaches into the bleeding canal, thus partially filling it. Then, with pellets of cotton in the pliers, the paste may be forced into the canal, and packed as hard as may be desired. The cotton pellets, besides forcing the paste into the canals, absorb the blood and excess of fluid from the paste.

If there be any reason to believe that any considerable quantity of free blood has been confined in the apical region beyond the paste, it may be allowed to escape by passing a small, smooth broach through the paste to the end of the canal, subsequently closing the opening with a sterilized gutta-percha canal

point. I use this paste as a permanent dressing in all canals where I have practiced extirpation, generally supplementing it with a gutta-percha point, and packing the paste with cotton pellets, using always considerable force to make it dense, and at the same time to force it into all irregularities of the canal.

I do not urge this as the only or the best method of filling root-canals in this class of cases. As it has proved itself satisfactory in my hands and as it seems to be non-irritating, permanently antiseptic, and is easily adapted to all cases, it may appeal to others.

Admitting that there are many cases in which all the pulp tissue cannot be removed from the most restricted portions of the canals, I wish again to urge that the most rational treatment for these cases is the surgical method that has been described, supplemented by immediate root-filling. The aid of nature's degenerative processes in so small a filament of sterile living tissue the nutrition of which has been seriously interfered with, could be more logically expected than the tolerance of the sensitive periapical membrane in contact with devitalized tissue which is subject to the usual putrefactive changes and which has been charged with a chemical poison.

Clinical experience bears out this conclusion, and while I do not wish to minimize the importance of thoroughness in pulp removal, I hope to encourage a more scientific means of compensating for our imperfect technique.

Nature surely is better able to take care of a reasonable amount of sterile waste products than we are able to prevent putrefactive and bacteriological changes in inaccessible dead tissue by infiltration of disinfectants.

SURGICAL PULP REMOVAL IN CHILDREN'S PERMANENT AND DECIDUOUS TEETH.

There are two classes of cases to which I desire to call particular attention in urging the selection of the surgical method of pulp removal:

The first comprises the incompletely formed permanent teeth of children in which the roots are not fully grown. In these the canals are large, and the apical ends of the roots often funnel-shaped. This class of cases is generally regarded as unfavorable for pulp removal, and, in my opinion, is subject to particularly disastrous results following the use of devitalizing agents. In my own experience these cases have proved to be most suitable for extirpation and immediate root-filling, by which methods these teeth have been made quite as comfortable and useful as those with fully developed roots, and I can see no good reason for believing that they will not permanently remain so.

In removing the pulps from the canals of these teeth, large-sized, well-barbed broaches should be used. The canals are often of almost uniform size throughout their entire length, and care should be used not to pass the instrument beyond the apical end. By rotating the broach about one-half or two-thirds around in order to engage the barbs in the pulp tissue, the pulp can usually be removed as a whole.

There is often profuse hemorrhage, which may be controlled by dressing and filling canals as suggested above. The first permanent molars are most frequently the subjects of early and disastrous caries, so insidious that the pulp is often exposed before the parents realize that these teeth are permanent. No teeth that we are called upon to treat are of greater importance and call more imperatively for preservation.

The second class for which I wish to urge the use of this method as being the truly scientific one comprises the decidu-

ous teeth, in which the most satisfactory results may be obtained.

CONCLUSION.

In closing I should like to express the belief that teeth from which the vital pulps have been removed by extirpation, and in which the canals have been aseptically filled, will have a much longer life than those in which devitalizing agents have been used. I should also like to state that I have never had in my practice one single case of swollen face due to infection following the use of this method.

Discussion.

Dr. H. B. TILESTON, Louisville, Ky. A very interesting subject has been presented, one which might be discussed at great length if we had the time. The manipulation of cases in which the pulp has been removed is a subject upon which there is a slight difference of opinion, though not a very vital one. A few years ago Dr. Smith said that anyone who used arsenic in teeth was guilty of malpractice. That was about the time when the wave of pressure anesthesia was going over the country. A great many who were using arsenic at that time began to employ pressure anesthesia in devitalizing pulps, because this operation was a rapid one; the pulp could be removed and an immediate root-filling be made at one sitting.

One reason for not immediately closing the wound created by the removal of the pulp is that there can be no escape about the end of the root for any accumulation of serum from the wound caused by the operation, and if any such accumulation occurs the serum should be allowed to escape through the canal. It is very easy to make a dressing which will preserve the aseptic condition for forty-eight hours, and then to proceed with the operation.

I would also like to call attention to another difficulty arising in this connection—namely: When the pulp is anesthetized and the anesthesia is carried beyond the end of the root, we may pass through the root-canal without the patient notifying us of the fact, because he does not feel any pain, and thus we may force the filling beyond the apex. I am not so sure of nature being willing to take care of any clot left about the end of the root. I presume, however, that if the blood is entirely sterile, and not a great quantity of it is present, the clot will be resorbed successfully.

Dr. S. B. COOK, Chattanooga, Tenn. In substantiation of Dr. Leonard's position, I believe, when we have extirpated a freshly exposed pulp by the method indicated, that the immediate filling of the root is an absolutely aseptic process. I believe that with proper manipulation a thoroughly antiseptic condition is established, and there is no possible chance for subsequent infection.

In regard to the use of arsenic, I think that when the wave of pressure anesthesia was going through the profession we discarded that drug almost entirely. If properly manipulated and employed in infinitesimal quantity, arsenic is a valuable drug in the dentist's hands. If in a hurry, we can clear the way a few hours before by the application of the arsenic, and I therefore think that we are not justified in discarding this drug. In my recollection I have never had a case of immediate root-canal filling in which soreness or complications arose afterward.

Dr. LEONARD (closing the discussion). I appreciate the remarks made by the gentlemen in discussing the paper, and think there is very little for me to add in closing.

I would like, however, to say in defense of this method in regard to its being more difficult than others, that, with a little experience, the operator becomes so familiar with the technique that it can be applied just as expeditiously as any other, especially since the whole operation can be done at one sitting. If it is not convenient to complete the operation when the patient first presents for treatment, some palliative remedy may be applied, and an appointment made for a subsequent sitting, instead of applying a devitalizing agent. From my own practice, in which I employ this method exclusively, I have come to believe that more satisfactory results can be obtained than by applying arsenic.

I will emphasize again that I should like to have fellow practitioners who may employ this system observe carefully their results in cases of imperfectly developed, incomplete roots in children whose incompletely formed molars, for instance, have been attacked by caries early. In such cases we have been warned against the use of any method of pulp removal. I have never seen any difference in results so far as I have been able to observe these cases. We have to treat a large number of teeth with imperfectly formed and developed roots, the preservation of which is most important.

The next order of business was a paper by Dr. T. P. HINMAN, Atlanta, Ga., entitled "Cast Gold Inlays," as follows:

Cast Gold Inlays.

By THOS. P. HINMAN, D.D.S., Atlanta, Ga.

FILLING the teeth with inlays made of gold or other materials is not so modern a form of practice as some people might think, but the perfection of this system in the last eight or ten years, which is due to the untiring efforts of Ames, Alexander, Taggart, and many other eminent investigators, has raised it to its present deserved prominence.

My purpose in presenting this paper is to explain, if possible, some of the difficulties that manifest themselves during the process of filling teeth with some form of cast gold. For convenience I will make the following divisions: (1) Cavity preparation. (2) Making of the wax form. (3) Investing. (4) Casting and preparation of the inlay for cementation.

CAVITY PREPARATION.

I will lay down the following rules for cavity preparation: Remove all angles from the inside of the cavity, and have the walls so formed that the matrix may be removed without difficulty or distortion. The main rule that I wish to lay down is that the cavity should be so formed that when the inlay is placed in its position without cement, it cannot be dislodged by the forces of mastication. To elucidate somewhat, I will say that cavities in bicuspids and molars, for the reception of inlays, should always have a

dovetail anchorage in their coronal portion deep enough to retain the inlay without cement. If the cement is depended upon entirely to hold inlays of this description, ultimate failure will be the most certain result, and yet we constantly see cavities so prepared. If the cavity extends below the gum line, the gum should be forced away by some process of wedging, such as gutta-percha packed between the teeth for several days or by the use of cotton and sandarac. When the cavity has been thus prepared, it should be carefully washed of all débris.

MAKING THE WAX FORM.

The wax should possess a minimum of expansion and contraction under heat and cold, and good edge strength, and should solidify in the temperature of the mouth and yet not crumble during the process of manipulation. The most perfect wax of this description has been produced by Dr. W. H. Taggart, and is now on the market. Dr. F. T. Van Woert of Brooklyn has made a metallic wax-former, by the use of which this material may be molded into various forms which will allow it to pass well up into the cavity, thus securing sharp margins in the deeper cavity portions. The proper temperature of this wax during the working process is very essential, and 136° F. is the temperature at which it works with the greatest degree of plasticity. The wax should be of sufficient hardness at mouth temperature so that it may be manipulated without distortion and carved to correct form. One of the difficulties experienced by careless operators is due to the fact that small particles of the wax which have been left in the cavity adhere to the inside of the wax matrix when it is replaced in the cavity for final adjustment. Blood may also attach itself to the inside of the wax, thus imparting a roughened surface to the inside of the cast inlay. After a matrix has been removed from the mouth, it should be washed in 3 per cent. hydrogen dioxid or in alcohol, to dissolve the blood and mucus and wash off the small particles of wax that might cling to its surface. If very thin tape is coated with vaselin and passed between the teeth over the surface of the wax form several times, the approximal surface may be left perfectly smooth. It is essential that if we expect to obtain a smooth cast, our matrix must be smooth, and if more attention were paid to this particular point, gold inlays would require very much less grinding and polishing after they have been cast. The sprue wire should be placed in the wax matrix as near the center of distribution of the gold as possible, for in this manner we are able to make a better casting than if the sprue wire is placed at some remote point which would cause the gold to have a longer flow before it eventually comes to a position of rest.

INVESTING.

There is no operation in the process of making gold inlays more important than investing, and uniform results cannot be obtained if the mixtures vary to any great degree. After a good investment material has been chosen and well tried out, and the proper mixture has been obtained, we should endeavor to make each subsequent mixture identical with the previous one. The simple way to do this is to place the water in the mixing vessel first. I prefer to measure this water in a small cup, and make the mixture in a rubber mixing bowl. If the water is placed in the bowl first, and the investment added slowly, so that it becomes thoroughly saturated, the mixture will be

found correct. A thin mixture is always to be preferred to a thick one. When the mixture is complete, if the bowl be tapped a number of times on the bench, the small bubbles of air contained therein will rise to the surface. The wax matrix is then painted, using a camel's-hair brush, the excess is poured into the investment ring, and the matrix submerged in it. Some operators have a habit of tapping the investment ring after this has been done, hoping thereby to bring all of the air contained in the investment to the surface; this, however, always results in the contained air catching in the form of bubbles on the lower surface of the wax matrix, and being cast as part of the inlay. Too much care cannot be exercised during investing. When the investment has hardened for a sufficient length of time, we are ready to remove the sprue wire. Some operators make the mistake of pulling it out without using sufficient caution, thereby disturbing the matrix in the investment by enlarging the form to such an extent that, when the inlay is cast, it will not fit. If, however, the sprue wire is warmed sufficiently to slightly melt the wax, the wire may be withdrawn without endangering the position of the wax form. This is especially true when we are casting small inlays.

CASTING.

Perfect inlays cannot be cast in gold alloys which contain zinc or other base metals. If it is desired to cast a gold inlay with an alloy, in order to produce a harder inlay, which will not oxidize and leave a rough surface, the alloy should always be either pure silver or pure platinum, platinum giving the harder inlay, but alloying above 10 per cent. with this material will produce a purple-colored filling. The investment should be placed in a warm oven and not over an open flame, and the wax burned out by this method. Too rapid heating of the investment will cause boiling of the wax and a consequent roughening of the inside of the mold, which will produce a rough inlay. Inlays may be cast in either a hot or a cold mold. Dr. Taggart advises the use always of the cold mold, allowing the investment to cool after the wax has been melted out. I have obtained the most uniform results in casting in the hot mold, but I do not use the open flame for the purpose of drying out the mold or heat to redness. The gold used for casting should always be in a lump or button, for if scraps are placed in the crucible and the heat is applied, these scraps melt first and form little globules that run down into the sprue hole and close it either partially or fully, so that the molten metal is either completely stopped from going into the mold or is retarded in such a manner as to make a round-edge cast or imperfect inlay. The button of gold that is left after casting should always be remelted and pickled in acid before it is used in casting another inlay. If this is neglected, a certain amount of residue will cling to the gold and produce a rough cast. Pressure should always be maintained on the molten metal for at least three minutes, as this, to a certain extent, will prevent the gold from shrinking from the margins. When the gold is thoroughly hardened the investment may be plunged into water, and the inlay removed. If a perfect cast has been obtained, as should be the case, we are now ready for setting the inlay in position.

CEMENTING GOLD INLAYS TO PLACE.

If we find that the inlay rocks along the line of the neck of the dovetail, we know immediately that we have left some

sharp angles at this point, which have been brushed off by the molten gold in flowing over them. If care is taken it is possible to trim either the cavity or the gold inlay sufficiently to allow it to go to place, although this is questionable practice, and it is preferable to make a new matrix. A portion of the inlay that goes next to the axial walls of the cavity must always be trimmed away so as to allow a perfect seating of the gold. In choosing a cement for the purpose of setting inlays, we should be sure that the granules of the oxid of zinc to be used are fine, because some of the cements on the market contain granules of oxid of zinc which are 1/500 of an inch in diameter; therefore a cement of this description would effectually prevent the inlay from being properly seated. The polishing of an inlay with a sandpaper disk before seating should always be done in the direction of the margins, so as to draw the gold through and allow a slight lap. This is also true in grinding down a set inlay in the mouth and polishing. A properly made inlay requires very little attention after cementation. If our technique is good, the inlay should be a finished piece of work before it is introduced into the mouth.

In this paper I have spoken only of the direct method of making cast inlays. I use almost exclusively in my practice the indirect or metal model method, by which I can obtain the most perfect results.

Discussion.

Dr. S. B. Cook, Chattanooga, Tenn. I have read the essayist's paper with a great deal of interest, and have noted several points that I wish to discuss. He has done as much or more in this special field than any practitioner in the South. Fifteen years ago I saw a gold inlay for the first time, one which Dr. Hinman had made, and I trust he will excuse me for telling how he made it. He prepared the cavity, took gold foil, burnished it into the cavity, and flowed 18-karat gold solder over it.

A few years ago, when we heard the first discussion on porcelain work, I went to Old Point Comfort, and found Dr. Hinman using the Jenkins method; whereupon I secured a Jenkins outfit. The next time I saw him he was using the Brewster bodies, whereupon I secured a high-fusing furnace, and gave the old outfit away. The next time I saw him, he said the medium-fusing inlay was the best. When I saw him again he said that the high-fusing porcelains were the only ones he was using. I have, however, derived a great deal of good from my intercourse with Dr. Hinman, and I believe that whenever the operator is careful and exact in his technique, he will never have any trouble with porcelain inlays, and that every failure is his own fault. Certain cavities can be filled better with inlays than with any other filling. In those cavities which extend gingivally on the approximal surfaces in bicuspids and molars, this method offers an advantage over any other. If any overlapping gum tissue is forced away and the cavity is prepared as the essayist indicates, leaving no little checks or rough, brittle edges, the inlay will fit and will be permanent.

When the cavity preparation is extended under the gum, with a strong solution of silver nitrate applied to the fundus of the cavity, providing against the possibility of its reaching the cutting edge, the recurrence of caries in my opinion can be successfully prevented. In children's teeth the action of silver nitrate is almost wonderful.

In setting inlays, the great mistake is often made that pressure is not kept up sufficiently long while the cement is setting, which accounts to a great extent for the lines showing around fillings.

Of investments, I believe the Standard to be the best, as it makes a smooth inlay, and when hardened will not break. I have discarded brushes altogether in investing. I used to put the investment on the impression with a small brush, and make another mixture for the bulk of the investment, but now I make one mixture for the whole work. Just before I mix the investment, I put the impression in water, then dip it in the mixture, set it on a table, and pour my investment.

With regard to wax, which is the most important factor of all, I regard Klewe & Co.'s wax as the ideal, after trying every one that has been on the market. I believe, after having tried three, that the best appliance for casting is the Elgin atmospheric machine, so called. In that machine an absolutely uniform and exceedingly strong pressure is obtained. It is so simple and easy that it is a pleasure to work with it.

Dr. N. C. Leonard, Nashville, Tenn. I should like to emphasize that in setting inlays the operator should be careful to cover thoroughly every portion of the gold that comes next to the wall of the cavity. It is also well to fill the cavity itself, or be certain that the cement comes into contact with every part of the wall before the inlay is forced home. The reason for that is that cement under pressure always flows in the direction of the least resistance, and if there is any point on the surface of the inlay that is not covered with soft cement, the cement is apt to flow away and leave a little place under the inlay imperfectly filled.

Dr. Hinman (closing the discussion). In reference to setting the inlay with cement, the only safe way is to mix plenty of cement, put plenty in the cavity, and always cover the inlay itself; then the operator is certain that the cement is in contact with every portion of the inlay as well as the cavity walls.

The purpose of my paper was to touch upon some of the points that have caused me considerable trouble in casting and making inlays, and to give some suggestions that would probably be of help in everyday practice. I do not know all there is to know about inlay work, and want to know as much as I can, but I am certain that if the operator is careless in regard to technique in inlay work, he invites failure. The inlay is the poorest preservative measure, if improperly executed, but if properly made it is the best filling we have so far found in our professional experience.

Dr. Crenshaw. I wish to move, Mr. Chairman, that a copy of the resolutions adopted yesterday be sent to Senator Overman.

The motion was seconded and carried.

The next order of business was the reading of a paper by Dr. J. P. Corley, Greensboro, Ala., entitled "The Adolescence of the Dental Profession," as follows:

The Adolescence of the Dental Profession.

By J. P. CORLEY, D.D.S., Greensboro, Ala.

"And Joseph dreamed a dream."

In the life of all sentient things there are six stages, *i.e.* embryonic, infancy, childhood, adolescence, maturity, and senility. Only the metaphysician is concerned with what follows after the last.

Childhood is the objective age. There is no vision, no imagination. Things are interpreted and understood in terms of the seen. The child is selfish and self-centered, imitates but produces not, takes but does not give. His first thought is for himself, not for others. He forms no partnerships and no alliances, entangling or otherwise. He is the soul and center of the universe.

With the advent of adolescence the subjective sense begins to develop, and vision and imagination begin to grow —things seen now suggest things unseen. Man's ego merges into that of his fellows, and he recognizes the force which created him. He learns to produce; to give and take and give again. He begins to recognize his obligation to his fellow man, to develop social instincts and pool his resources. He creates ideals and strives to attain them, and is satisfied with nothing short of the infinite and ultimate.

This is the crucial period, when the foundations of his future life and the corner-stone of his character are laid. At twenty a man's possibilities are determined and his destiny written. Destiny is determined by environment plus heredity.

The order of nature is one long story of growth and development. There is no such thing as autogenetic spontaneity. If there were, the universe might be swept into order or chaos in one short generation. There are epochs, to be sure, but they are the natural fruit of long accumulated environment.

Professions also have six stages. In the eighteenth century dentistry as a profession was born; the nineteenth witnessed its infancy and childhood; with the dawn of the twentieth it is approaching adolescence.

I say *approaching* advisedly, for when I remember that only ten per cent. of the people receive dental attention, and that in the United States last year there were approximately eighty millions of artificial teeth made, I am impelled to believe that we are little removed from infancy.

Forceps are manufactured by the thousand, plates are made by the tens of thousands, and teeth are extracted by the million, and still we reach only ten per cent. of the people. If we served them all, and dentistry were practiced on all of them, as it now is on a few, we should need to beat our plowshares into forceps and honeycomb the earth for feldspar, silex, and kaolin.

When we say we are approaching the age of adolescence, we are illustrating the psychic phenomenon of picturing the thing which is as the thing which ought to be.

Men who are among our best extract lower first permanent molars in young patients. Men among our best prosthetists equip the mouth with mechanisms which a dentist, even though he were in

constant attendance, could not keep clean. Men among our best operators practice extension rather than sanitation for prevention. Men among our best orthodontists harness up the mouth with apparatus which makes it a veritable cesspool. Men who hold official positions in their state societies extract teeth, and then nurse the astounding delusion that, after this is done, they can establish the facial balance and normal occlusion.

Notwithstanding these undeniable evidences of puerility, we are beginning to see faint shimmerings of the rose-tinted dawn of a new era. We are beginning to dream dreams and see visions.

During the last two years hundreds of thousands have heard the gospel of mouth hygiene and immunity through sanitation. Thousands of children have received attention through free dental dispensaries. Municipalities and state boards of health are taking up the promotion of the community's dental health. Dental colleges are preparing their students to teach oral sanitation to the public. Dental journals are filling their pages with literature on this subject, and the commerical and professional interests are joining hands in the interest of this cause.

In fact, every interest identified with dentistry, from the commercial charlatan and the professional quack at one end of the line to the commercial artist and the professional scientist at the other, is waking up to the marvelous possibilities of the new propaganda.

The mighty undercurrents of zeal and devotion to a higher ideal, and the cross-currents of greed and selfishness, are developing a situation which threatens to become chaotic.

This is but the logical course of evolution. It is the maelstrom of adolescence. There was never a time in the history of this or any other profession when the flood-tide of opportunity tipped so high a crest or when professional chastity and transcendental zeal were at so great a premium.

Truly the hand which lays the foundation writes the dimensions of the dome, We are building not for ourselves alone, but we are writing the status of dentistry when it shall have reached the full stature of manhood. The earth is still young, the human race is young, and the dental profession is very young. You shall not say that it is a pipe dream when I maintain that the time will come when the dental forceps will be found only among the dusty rubbish of a museum of antiquities.

Last year I offered a resolution that it be declared the sense of the Southern Branch that no man should be accounted eligible to membership on a state examining board if he had tartar on his teeth. The motion was lost—but we are young, very young, and if my time of probation will be extended to the full threescore years and ten, I shall live to see not only such a motion passed, but the law enforced.

It is a never-ending source of wonder that while all agree as to the necessity for educational work, and admit the practical possibilities in the matter of eventual remuneration to the dentsf, of benefit to the public, and of honor and prestige to the profession, so very few will even reply to a letter which the official representative of the Southern and National Associations addresses to them in reference to this work.

However, this too has its rosy side. Among the letters received this year two

stand out as conspicuous examples of the spirit of the profession when it shall have fully reached adolescence.

The first is from a man who, born before his time, camped on the frontiers, blazing the way for the multitude which will build cities where he pitched his tent. The author of the other letter is in the full flush of rich young manhood, gifted beyond his fellows both in ability and opportunity, and with the wealthy heritage of a sire who is one of our oldest and most beloved members.

TUCSON, ARIZONA, October 26, 1910.

My dear Dr. Morgan,—In my rejuvenation and new lease on life, I hardly think it fair that Corley should go to reminiscing so far back in the past. But of a truth, though at the present I am feeling like a youth, it is a good number of years since I commenced my principal life-work in the field of dentistry.

In all these years—think it is over forty—I have never claimed honors in the field of originality, but have appropriated the ideas which have been shed from greater lights, and have profited by their experience. In a few instances I have put to successful test some truths emanating from those who figuratively, if not literally, have communed with angels, whose visions and inspirations I have accepted as facts and have proved them such, have adopted and used them, and endeavored to pass them along.

It is a great pleasure to me to find those who have profited by my efforts and are zealous that due honors be paid me. What I have given I have freely received, and have freely given again. I desire to make no claim for precedence. If I have caught on early, and have been able to pass it along, to know that it has been helpful to others is honor enough for me.

As to the motto, "Clean teeth do not decay," I cannot tell just when I began to use it on my bill-heads. It may have been in the eighties or early in the nineties. It was first placed on some small bill-heads I had printed by Charles Brandon. I have had several lots printed since. A reference to my account with him might establish the date.

Without any claim for originality, I have always promulgated the idea of strict prophylaxis, and that prevention was better than cure. I am especially glad that Corley is at work in so prolific a field of endeavor. It will be congenial to him. I wish him abundant success.

Ever yours,

1500 LOCUST ST., PHILADELPHIA,
March 7, 1911.

My dear Dr. Corley,—You are most welcome to use anything of mine you may find which will be of the slightest service to you, and I do not wish any credit for it.

If you have no copy of the slide about which you write, I shall be very glad to send you one which may be better than that obtained from photographing a half-tone.

You are doing a very good work and I wish you every success in it.

With kindest regards, I am,
Sincerely yours,

There are three classes of men in the dental profession: Those who cannot be induced to engage in the work on any account—making 90-plus per cent.; those who will do something if they are assured of full credit, pressed down and running over, 9 per cent.; and those who, like the authors of the foregoing letters, seek no reward. But we are young yet, very young.

It would be preposterous to expect a profession which is but a few generations old, and whose recruits come almost entirely from the agricultural, industrial, and commercial classes, to have developed the artistic, scientific, and altruistic spirit.

The heritage of all the past is ours. The responsibility for all the future is upon our shoulders. We are approaching that marvelous, mysterious, unspeakable crisis—the crucial era of adolescence.

Discussion.

Dr. F. A. JOHNSTON, Sheffield, Ala. I can add nothing to this most excellent paper by Dr. Corley. I admire the great work that he is doing in this field. I admire his enthusiasm, of which, in spite of ourselves, we cannot help but absorb some. He is doing a great work, a work that is being carried forward all over the world at the present time. Just as he says, the whole world is waking up to it; the journals are filled with it, and everyone at the present time seems attracted toward this great movement.

Dr. CORLEY (closing the discussion). I had hoped by this paper to help us to realize how little progress we are making. We are in the habit of standing on the floors of our associations and throwing bouquets at ourselves and talking of the marvelous strides of the profession. We do not think of the other side, and how little we have done and how much more we might have done. Gentlemen, we are nothing better than mechanics and artizans! Why in the name of decency and consistency do we want to be called doctors? I should like to know why we are entitled to this degree as long as we pull out teeth. There are five bushels of teeth in my exhibit, which were extracted, some of them at least, by the best men in the profession. More is the pity! Why is this done? Because we are cowards. Let us wake up, and do something worthy of a *doctor*. We are just postponing the millennium, and God himself cannot bring it about until we help Him. We are His instruments, and He cannot do good work with poor instruments, with all His infinite power.

The meeting then adjourned until the afternoon session.

THIRD DAY—Afternoon Session.

THE meeting was called to order on Thursday afternoon, by the president, Dr. Hassell, at 2.30 P.M.

Report of Committee on Necrology.

The first order of business was the report of the Necrology Committee, by Dr. R. B. BOGLE, as follows:

Mr. President and members,—Your Committee on Necrology reports the death of Dr. J. P. Gray of Nashville, Tenn., on September 30, 1910. Dr. Gray, at the time of his death was a member of the Executive Committee of this association.

Your committee recommends the adoption of the following resolution in regard to the death of Dr. Gray:

RESOLVED, That in the death of Dr. Gray, we have lost one of our most loyal and earnest co-workers. We shall miss him at our meetings, and the absence of his genial smile and affable manner will be painfully felt.

RESOLVED, That these resolutions be spread upon our minutes, and that a copy of them be sent to his bereaved family by the secretary.

Respectfully submitted,

R. BOYD BOGLE, *Chairman*,
WILLIAM CRENSHAW,
L. P. DOTTERER, *Committee.*

Dr. FINLEY moved that the resolutions be adopted as presented.

Motion carried.

Dr. M. F. FINLEY, Washington, D. C., was extended the privilege of the floor in order to explain to the association the present status of the suit against Dr. Boynton by Dr. W. H. Taggart in regard to the cast inlay process. Dr. Finley stated that the suit was being defended by a committee of dentists in Washington, and that he felt sure that the courts would very soon render a decision in favor of Dr. Boynton.

Dr. MELENDY, on behalf of the Committee on Revision of the By-laws, asked for an extension of time before they were called upon for a report.

Motion was made and carried that the committee be granted an extension of time in which to prepare their report.

Dr. MELENDY then presented the following resolution with regard to the association setting aside one dollar from the dues of each member for the Journal fund of the National Association:

RESOLVED, That the Southern Branch of the National Dental Association, in conformance with the action of the parent body taken at Denver in July 1910, authorizing the treasurer to set apart one dollar of the dues of each member, beginning with 1911, for the benefit of the Journal fund, does hereby authorize the treasurer of the Southern Branch to likewise set apart one dollar of the dues of each member of the branch for the same purpose.

Dr. BRABSON moved that the resolution be adopted.

Dr. MASON moved that the resolution be amended to the effect that this resolution take effect in 1912.

The motion was then carried as amended.

The next order of business was the reading of a paper by Dr. G. V. I. BROWN, Milwaukee, Wis., entitled "Pathologic Conditions of the Mouth and Jaws," as follows:

Pathologic Conditions of the Mouth and Jaws.

By G. V. I. BROWN, M.D., D.D.S., Milwaukee, Wis.

I wish to apologize for having my plans disarranged so that I could not be here at the time my paper was to have been read. What I had intended to say about pathologic conditions was based almost entirely on a large number of slides which I brought with me to show, in order that we might have before us some tangible evidence in regard to our subject. I was told that there would be no lantern, but that I was expected to make good.

I shall not discuss the various pathological conditions of the mouth, but will merely mention them. I will therefore take up one division of the paper, which I may make clear without the aid of illustrations. This will be a sort of eleventh-story addition to what our friends talk about in oral hygiene. The particular division referred to relates to the effect upon the body as a whole, in addition to the direct benefit, of restoration in alterations of form which are caused by arrest of development in the maxillary region.

I understand perfectly well that it

would be useless to indicate before this intelligent audience the various pathological conditions found in connection with adenoids, enlarged tonsils, and all those affections which we find in the throat and which may be associated with one another. We have known for a long time of the more or less direct relation between the maxillæ and the nose in development, but it occurred to me some time ago that it would be well to have some more tangible data on this subject. I therefore selected a litter of puppies and wired their jaws in such a way that the maxillæ could not grow or expand in the direction which would increase the measurement across the palate. No compression was applied beyond that necessary to place the teeth in the bicuspid region of the dog, or at least the region which would correspond to the bicuspid region in man, in lingual occlusion. The effect of these appliances upon the puppies at first was practically *nil,* and they thrived equally well for a considerable length of time. The control dog, however, in which no appliance was inserted, grew larger and stronger, with a marked difference in the shape of the face, and, as time went on, for about six months that difference greatly increased. One of the puppies died, and one which was killed when we came to conclude our experiments was a mere mass of skin and bones, ill-nourished, while the control dog was perfectly strong and well. Another puppy from the litter, after it was killed, was found to exhibit congestion of the lungs.

I had been told that if I could produce in the dog contracted nares, deviated nasal septa—these deformities being common among our patients, as we know—this would be an extreme test, because the dog depends almost entirely upon the nose for breathing. You all know, of course, that the dog hangs his tongue out when tired, but this is not done for breathing purposes, but because this is the way he perspires. The dog can, under stress, get a little air through the mouth for emergency purposes, but he cannot continue this form of respiration long. The sections shown are made from the head of one of these puppies and the control pup. The section was made through the nose, through the upper and down through the lower jaw, and we see there all the deformities which are noted in patients suffering from the same condition of the mouth. In other words, the average school child who has a contracted upper arch, especially when locked by the lower so that it cannot expand, is in practically the same situation as these puppies, when I prevented the growth across the mouth. Such children suffer a good deal from colds and various other disturbances; in the same way in these dogs we found that the mucous membrane lining the bronchi was in an unhealthy condition. The healthy dog, as you know, is practically immune to micro-organisms. He can adapt himself to almost any micro-organism of ordinary virulence and not become affected, but just as with man, if the breathing is interfered with, the whole condition is changed. These dogs became highly susceptible to micro-organisms, and were easily subjected to infection.

So much of the demonstration described was done before I took up this division of the work. Dr. Anderson performed these experiments by suturing the nose and packing-in cotton and in various ways obstructing the noses of the dogs, and noted the high susceptibility to micro-organisms that I referred to. He also found that these dogs became hair-

less and that puppies of such mothers had a tendency to become hairless. I concluded that we might produce a corresponding condition in our own way by producing the condition which we are all accustomed to see. These conditions are shown here [demonstrating]. The upper picture is that of the control dog, and the lower one of the puppies which was operated upon. I believe that the principle here demonstrated applies all along the line of oral hygiene, about which we have talked so much and in which we are deeply interested. When the teeth are lost, a corresponding extent of arrest of development of the maxillary bone occurs, and the jaw is not fully developed. Cases which require orthodontic treatment, but do not receive it, ultimately result in such conditions as this sooner or later, and we find these children suffering from catarrh and various other disturbances, which must eventually be treated by the rhinologist.

I would not like to say that this work which we are doing should be given precedence over other etiological factors that are more familiar to the rhinologists, and I consider it a mistake to urge the question of precedence. I feel that it is enough for us to demonstrate with absolute certainty that by arrest of development in the oral region these conditions can be produced. In these experiments performed by Dr. Anderson, it was demonstrated that the conditions were directly due to nasal obstruction which had to do with nasal deformity and all that goes with arrest of development. In Chicago I saw dogs and other animals treated in that way, exhibiting marked acceleration of the heart action, marked increase in blood pressure, and marked nervousness. Unfortunately, we were unable to determine whether the nervousness was due to the effect of our presence, these animals being frightened, or whether the nervousness was the result of the condition produced. I am inclined to believe that it was due partly to both factors, because the high blood pressure and the rapidity of heart action was characteristic of the animals in which these conditions were constant.

I have lately become interested in the relation of nervous diseases to this particular field of ours. Certain nerve affections, such as paralysis, etc., we have sometimes followed up in our work, but in my opinion there is a very much wider application of the relation between mouth disease and nerve disease than has ever been demonstrated. How much or how little this condition which we have under consideration has to do with nervous affections, I am not prepared to say; but before leaving this subject I should like to suggest that those of you who are treating patients by orthodontic measures of one kind or another, for the patients' benefit as well as your own, carry the examinations a little farther. It has been interesting to me to note in the last few years that it is quite common in these patients to find asymmetrical development beyond that of the jaws and teeth, *i.e.* that there is a lack of symmetry or growth in these patients. One side will be more fully developed than the other, and after excluding the element of right-handedness and lefthandedness and other factors which would account for development of that kind, there is still an amount of asymmetrical development unaccounted for. The enlargement of the shoulderblades of the patients is one of the premonitory signs of very serious nervous affections, which, if progressive, ultimately end in paralysis. You will find a good many large shoulderblades in

your patients, and I am satisfied that, if orthodontic measures are instituted and the general upbuilding of the patient is guided into normal channels, asymmetrical development ceases and restoration to normal form takes place. I have in mind one case particularly. The mother of this patient told me that she had to have the dress of the child altered for the shoulderblade, and later on, after there had been restoration of the conditions to normal, this was not necessary. Reports of this kind make us realize that a number of exceedingly important truths are lying very close to the surface.

I am mindful at this moment of the fact that there is a trend to magnify the importance of conditions that lie within our own specialty, and our natural disposition is to spread to the field of medicine and surgery in discussing diseases of the mouth. This we should avoid. But I will ask you in conclusion that in the future you give as much attention as possible to the general development of patients as well as to the mere outlines of the dental arches, as I believe the final result will be greatly worth while.

I wish to thank you for the kind reception accorded to me, and to apologize again for the manner in which I have presented this subject.

Discussion.

Dr. J. D. Patterson, Kansas City, Mo. I have been very much interested in what has been said, and believe that a great deal of what the essayist has told us is new. I have noticed that very many of the cases that we treat for gum diseases and pyorrhea are the result of deflection of the septum and improper breathing through the nose, the nose becoming stopped from one cause or another, accentuating the condition of the gums. I do not doubt that the whole alimentary canal may be affected by these conditions, that the liability to infection may be increased, and that the ability to withstand irritation is greatly lessened.

Dr. H. H. Johnson, Macon, Ga. I wish to express my appreciation of the research work of Dr. Brown in oral surgery, and compliment him on his wonderful skill. I do very little practical surgery myself. I enjoy seeing expert specialists work in this field, and like to observe their wonderful operations and the results they obtain. I believe in Dr. Brown's manner of operating, having had the pleasure of seeing many of his wonderful operations and of observing the perfect results obtained.

I fully believe in the early expansion of the dental arch. If there is evident necessity for this operation, if it is done early the result will be easier of accomplishment, and the benefits accruing therefrom will be greater; gaining room for the permanent teeth, expanding the nasal passages, lessening the danger from adenoids, etc., are some of the many benefits to be derived that are paramount in importance.

Dr. M. F. Finley, Washington, D. C. I am always interested in any subject in which Dr. Brown engages his energies for the purpose of presenting it to the dental profession. I grasp from what he has said that there is such an intimate relationship of the parts of the body with one another that what we sometimes may be inclined to consider as, and what is generally expressed by the term local manifestation is really not local, because owing to this intimate connection all parts of the body sympathize with any condition that exists, and it is difficult

to say, in any disease we see, that it is simply of a local nature. Almost every disease has to do with the blood current of the body, and if the blood current is involved a disease can no longer be local, because the blood current has to do with the entire body. I appreciate the essayist's admonition to look farther than the mouth for any abnormal condition, and its effect upon other parts of the body, and shall look for manifestations of irregularities in the entire body, to see whether these conditions will not improve after the teeth have been treated.

Dr. J. P. CORLEY, Greensboro, Ala. The essayist has given us a very interesting paper, and I cannot hope to discuss the subject in a way that would develop any additional information, but I want to say this: If we could have reprints of this essay, with the illustrations accompanying it, to keep on our office tables and to give out among the mothers in our *clientèle,* in the next generation we would not find so many crooked noses, narrow jaws, etc.; nor would we see so many narrow, slender, tuberculous men in the land. It seems to me that if we had the money, it could not be spent in a better way than to have just such literature printed and distributed. I for one would be glad to pay for such literature, to give it to my patients, and inaugurate in this way an educational campaign that in the next generation would make dentistry a science instead of a trade.

When I was fifteen years of age I was a fairly good-looking boy, but a dentist—a tooth carpenter, for he was no more than that—extracted one of my lower first molars. At that time I weighed one hundred and fifteen pounds, and last night I tipped the scales at one hundred and ten. I believe it is because of that fact that I have not properly developed, do not get enough oxygen, continuously suffer from sore throat, and probably my grandchildren will have small chest expansion because of the loss of that molar, which in my case caused arrest of development of the maxillary bones. Let us wake up and get literature on this subject, distribute it among the public, and try to bring about the publication of a text-book for dental colleges, emphasizing and developing all the fields and phases of oral hygiene. Dr. Brown should write a paper on maxillary development and its consequences for the system.

Dr. HASSELL. The chair wishes to thank Dr. Brown for his paper, which treats on what seems to be an exceedingly important and interesting subject.

Dr. BROWN (closing the discussion). I thank you all for the kind words you have said about my small contribution. Dr. Patterson touched the keynote when he spoke of the increased susceptibility to infection. We sometimes waste time in trying to be too specific in explaining comparatively unimportant phenomena of disease, and often get beyond our depth in endeavoring to account for them. As a matter of fact, the really vital questions are those which pertain to immunity and susceptibility. The factors that increase or diminish the one or the other lie at the base of the pathological structure, which must account for pyorrhea, as suggested, and other diseases as well. If in their treatment there is one influence which we know to increase susceptibility, then we should immediately attempt its removal.

Dr. Johnson spoke of himself as a mechanical dentist. This is a question into which mechanics enters largely. The nose grows defective, simply because of mechanical influences. In the study of development we are now applying ourselves more assiduously than formerly

to the study of the mechanical forces involved.

The orthodontists of the future will need very little time for nasal enlargement, because they will apply pressure across the arches to spread the maxillæ by separating the median maxillary suture, and produce the improved nasal development that is so essential an object with the rhinologist. When there is room within the nares for perfect respiration, then the occlusion can be arranged and the arches made to correspond. As a general proposition, if, instead of trying to move one tooth at a time in expanding the dental arches, spreading them so slowly and carefully as is the common orthodontic practice, simple but positive measures be employed to give the necessary jaw increase promptly and to aid the dental development in such a way that the child will have a larger nose, and have it right away—in approximately ten days' time—and then treatment of the dental arches be continued according to regular orthodontic principles, the results from the standpoint of health would be altogether different. I did not intend to touch upon the question of posterity as suggested by Dr. Corley, but I do not believe that Dr. Corley's grandchildren will be as he pictures them, for the reason that he is spreading the gospel of oral hygiene all over this country, and as a result these disadvantages will be corrected.

I am glad that Dr. Finley has seconded the thought of going a little farther in our measurements and examinations. My idea is that this question is solving itself in the evolution of its development through the country. Some day, we hope, the school children will be examined by general practitioners of medicine and men who are specialists. Instead of working as separate units, the representatives of internal medicine, eye, ear, nose, throat, dentists, and sanitary scientists will act in concert. Each in his own department will make examinations, measurements, and diagnoses, so that these, when combined and compared, will furnish a complete picture of the true physical requirements of each individual. Then symmetrical facial development will go hand in hand with general bodily symmetry, and oral hygiene from its central vantage-point will assume its rightful position. I hope this discussion will resolve itself into a crystallization of that idea. I hope each one of you, as opportunity offers, in associating with medical men throughout the country, will urge the possible value of comparison of the results of diagnostic examinations, that they may be used for the greater benefit of patients. If we secure such measurements of children and guide their development with the idea of attaining complete symmetry of form, and train mothers in matters pertaining to the preservation of general health as well as in the care of the teeth, shape of the dental arches, etc., our goal will be reached. Taken in the aggregate, these different efforts will help us toward the solution of our own special problem.

Our field of operation so closely relates to all other divisions of the body that the demonstration of a single truth carries with it so much that is important to or dependent upon the co-operation of other parts, that it is quite impossible for one individual to do justice to its possibilities and also give sufficient time to the practice of his profession. Only by proper scientific co-operation with all others who legitimately treat bodily disease in any form will the treatment of oral affections ever reach the height of its almost unlimited importance.

Dr. MELENDY moved that Dr. Beadles' paper be read by title.

The motion was carried.

Dr. BEADLES' paper here follows:

The Day of the Operative Dentist At Hand.

By E. P. BEADLES, D.D.S., Danville, Va.

DENTAL surgery is the most important of all the specialties. This may seem much to claim, but a little thought will convince any fair-minded person of its truth. Any other specialty has to do with one or two organs only, the loss of one or more of which may be inconvenient but not fatal. The mouth specialist stands guard over all parts of the body, hence over general health and life itself.

Nutrition is at the base of all life, Mastication of food is the first step toward proper nutrition, hence the organs of mastication should be in the best possible condition for the performance of this duty. But this is not all; the mouth is one end of the alimentary canal, and everything that enters the system must pass through this portal. The food may be good and wholesome, but if in passing through the mouth it becomes contaminated with the pathogenic germs found there, how can the digestion be kept right?

I repeat, the mouth specialist is the most important of them all. This being true, we should set on foot every means possible to prepare the men who enter upon this branch of medicine for the very best work. "Better qualification" is the slogan in all the professions; why should we lag behind?

The state of Virginia has a law requiring the M.D. degree for dental surgeons, and this is as it should be. The reasons for this step are too manifest for me to stop to give them here. Unless we wish to class ourselves with the osteopaths and all other "paths," we must be properly and regularly prepared for the practice of medicine.

MECHANICAL DENTISTRY.

I do not mean that the dental or mouth specialist needs to study medicine in order to make a plate. The man who makes a wooden leg or a glass eye should know a little of the anatomy of the parts, but he does not need any knowledge of medicine. When our specialty has reached the place to which it rightly belongs, we will send the man with no teeth to an artist who will fit him with a set. I am not saying this to degrade plate work, but am talking of the dental surgeon, and he cannot well be two men and follow two callings at once. Where the natural teeth are used as supports for teeth inserted, the work will come properly within the province of the surgeon; where there are no teeth the artist is the man to do the work. It requires a very high class of skill to do plate work, but this skill and that of the surgeon are seldom found in the same person, which is another reason for separating these callings.

Let us hope that the day may soon come when all the states of the Union may follow the lead of old Virginia, so

slow in many things but leading the world in this, the higher education of its dental men.

ORAL HYGIENE.

Never at any time in the history of medicine has there been so much interest manifested in hygiene as now, especially oral hygiene. The schools and leading educational men are realizing that the pupils do much better work when they are in health, and the beginning of health is a clean mouth.

I know of no power which is doing so much to emphasize the truth as the Colgate Company in the advertising of their dental cream. Their motto is "Good teeth, good health." What could be finer? I cannot make any statements as to the efficiency of this cream, but a firm that sticks to so good a motto deserves success.

The evolution of thoughts is slow. It has taken man many hundreds of thousands of years, and has caused him many a struggle, to bring himself from a "brother to the ox" to his present high plane; but there is very much ahead of him yet. In fact, he has only just reached the point from which really great things may be expected of him. For thirteen hundred years, from Galen to Vesalius, every thought was guided by authority. But Vesalius, wonderful man that he was, refused to be ruled by authority, and began a search for himself. Thus came about the first real study of human anatomy. Even to this day we are so hedged about by authority, of one kind or another, that we are afraid to express an original opinion or to perform a new operation. Let us be men, and modern men. Like Voltaire, "I love a man who says what he thinks." The search for scientific truth, and science is truth, must go on. Each has his duty to perform, let none be afraid.

THE NEW ERA.

I dream of a time when all the members of our noble specialty will have been duly qualified for its pursuance; when owing to the cultivation of the mind and training of the hand there will be no more charlatans; when one will see no longer in our large cities the "sandwich man" advertising the parlors of dental fakers; when the esthetic sense will no longer be outraged by a gold crown on a central incisor. In that good day columns in the newspapers will not be filled with lies concerning the wonderful performances of so-called dentists, who would disgrace any calling, however low. I can see with a prophetic eye the whole medical profession working together for one common end—that of the amelioration of human suffering. In that good day jealousy and hard feeling will be put aside; the practitioner of general medicine will not look askance at the specialist, but all will be equal, having had equal opportunity. In that much-wished-for day our schools and state boards will have found a better way—than now—to know the qualifications of applicants for licenses. The boards will not require actual operations, but leaving this part to the schools, will examine only on theory. What a sight to witness a dozen country boys, each lugging a dental engine and a box of "tools" up before the examining board!

How slow is the evolution of thought, and how hard it is to get away from old things and old ideas! Our academic schools still waste years and years upon Latin and Greek, and why? Simply because five hundred years ago the universi-

ties had to take up these studies, there being nothing else to teach. To train the mind? Where are biology, chemistry, astronomy, botany, and hundreds of other new and interesting subjects?

The day of the dental surgeon is at hand. Let him rise up, claim his own, and qualify himself to be the equal of any man. Take no second place! "First place or no place" is the motto of every true American.

The next order of business was the report of the Committee on Appliances and Improvements, by Dr. W. H. SCHERER, Houston, Texas, as follows:

Report of Committee on Appliances and Improvements.

By WALTER H. SCHERER, D.D.S., Houston, Texas,
CHAIRMAN.

Gentlemen,—We, your committee, are impelled to the belief that manufacturers of dental specialties do not entertain an adequate appreciation of the value of the work of this committee. In few instances were concise descriptions of articles sent —as had been requested of all; for the remainder we were compelled to read a mass of descriptive matter from catalogs and circulars.

These observations are not intended in the spirit of complaint, but are given merely to convey the idea of a rather regrettable condition confronting this committee.

There have been numerous meritorious articles offered to the profession during the past year, appliances and improvements that have lessened laborious work and have rendered possible the attainment of more artistic results in both operative and prosthetic operations.

GOSLEE'S CROWN AND BRIDGE TOOTH.

Through the untiring efforts of his brilliant mind and mechanical genius, our beloved and highly esteemed *confrère,* Dr. Hart J. Goslee of Chicago, has designed a crown and bridge tooth which promises the millennium of crown and bridge work. Very little has been made public concerning this innovation in our work. With his characteristic generosity and professional spirit, Dr. Goslee very kindly gave me the report, from which I quote:

> The attachment of porcelain teeth or facings to the metal structure by means of soldering, *or even casting,* is always fraught with uncertainty and danger, and in view of better methods is technically wrong. It is wrong because the procelain is thus subjected to a degree of heat which must endanger its structural integrity, and influence the preservation of its color; it is wrong because it is thus attached in a rigid and unyielding manner, and hence, being friable, is more likely to fracture under the stress of mastication; and it is wrong because in the event of any possible accident, no favorable opportunity for repair or replacement is ever afforded.
>
> The elimination of these objectionable features and possibilities must necessarily constitute an improvement, and such an improvement is to be obtained by the general use of replaceable teeth attached to the supporting structure only by means of cementation. This means of attachment for the porcelain is reliable in proportion as the adaptation of the metal to the porcelain may be close and accurate. The porcelain is stronger when

so attached, because it is not subjected to any degree of heat, and is not held so rigidly. It is better because, not being held so rigidly, it is less likely to become fractured; and because the color is never changed, and opportunity and facility for replacement in the event of accident always presents.

These possibilities and advantages, however, are to be adequately obtained only in some form or type of tooth which presents as much porcelain as possible; which is not weakened by the presence of metal pins, or by provisions for retention, and which therefore possesses a maximum of strength; which is of natural form, and more or less universally applicable, and which will need but a minimum of grinding to effect the desired and required adaptation.

This latter feature, as applied to the lingual or retentive surface, is essential because, in proportion as a given form of porcelain tooth will require but little or no grinding upon this surface in effecting its adaptation, in just this same proportion may it be expected to be replaceable or interchangeable.

All of these combined advantages, I believe, are to be obtained in a special form of tooth devised by your essayist, and made by the Consolidated Dental Mfg. Co., to be known as the Goslee Crown and Bridge Tooth.

As will be observed, these teeth are of natural form, possess the splendid strength and color characteristic of the Consolidated tooth bodies, are adapted to single crown work where any form of metal base is used, as well as to dummies for bridge work; afford a minimum display of gold and require but a minimum amount of grinding, and with a sufficiently large variety of molds—which are promised by the manufacturers—will be almost universally applicable.

It will also be observed that these teeth are strongest where the greatest strength is required; that they are provided with ample opportunity for a secure retention to the supporting base or structure; that the pins which are made for them, which are to be furnished in iridio-platinum, clasp metal—which will withstand 22-k gold—and German silver, will afford a secure means of attachment of the tooth to the metal base or structure.

The following is a list of contributors and articles offered:

S. S. White Dental Mfg. Co. New goods and appliances brought out during 1910:

Silver Abscess Socket Probe—suggested by Dr. Chas. A. Brackett. The probe is mounted in a hub, both ends of which are threaded to fit a tubular holder, the length when operating is 5½ inches; closed for the pocket, 3 inches. The flexibility of a thin wire of silver specially adapts it for exploring the fistulæ of alveolar abscesses. The points are slightly enlarged and blunt, to avoid risk of puncturing the walls of the sac.

Flat-end Taper Inlay Burs. These are not intended for cutting enamel, but for shaping a cavity for inlays so as to avoid undercuts. Their flat ends enable one to make sharper angles than with round instruments. The heads are long enough to reach from the surface of the tooth to the bottom of the cavity. They are made in three sizes plain-cut, and three sizes dentate, for chuck and cone-journal and angle appliances.

Plastic Filling Instruments—patterns furnished by Dr. G. T. Gregg. Two features are especially prominent, their thinness of blade and their curving. They enable one to get into and work in interproximal spaces too narrow to permit ordinary instruments to enter. All the blades are of spatula form, flat, springy, to force the filling material to place, with sufficiently sharp edges to trim off any surplus.

Easy-flowing Silver Solder Wire—suggested by Dr. Josef Grünberg, Berlin, Germany. The Easy-flow silver solder has been put up in wire form especially for orthodontists, but it is invaluable wherever minute quantities of silver sol-

der are to be used. The wire is coiled, with a sliding metal band to control it. To use, simply uncoil an inch or two of the wire to the spot to be soldered and direct the flame upon it. The minute quantity needed is melted off the end almost instantly, and you have no bother cutting and placing a small bit of solder.

Gold and Platinum Expansion Arches and Band Material, Angle System. At the solicitation of many orthodontists, Dr. Angle has added these appliances. They are made of a special combination of the two metals worked out to give the requisite spring. They are invulnerable to the fluids of the mouth.

Additional Trays for Malocclusion Impressions. These two new trays, No. 23 upper and No. 27 lower, are of the general style of the other Angle trays, having the high vaults and rims to allow room for the teeth, but smaller, so as to facilitate the making of models of the mouths of young children.

Tube Adjuster for "D" Bands, Angle System—suggested by Dr. Josef Grünberg, Berlin, Germany. Frequently, on having attached an Angle "D" band to a tooth, it is found that the tube does not align properly for the attachment of the various parts. To adjust this irregularity, this instrument is formed with a shoulder, just as the inside of the tube is, and the two bearing surfaces are made to accurately fit the two calibers of the tube, so that the necessary movement is easily made without damage to the tube.

Root Pliers No. 61—suggested by Dr. A. Brom Allen. These pliers are not intended for actual extraction of roots, but for the removal from the socket or the mouth of the roots or slivers after the actual extraction has taken place; also for probing the sockets and removing loose remaining bits of the alveolar process. They are also useful in some cases of extraction of deciduous teeth. They are well designed for the purpose, being sufficiently heavy and strong, with delicately formed points, are less formidable in appearance than forceps, and more easily handled.

Alexander's Plastic Inlay Gold—invention of Dr. Chas. L. Alexander. This is a pure gold in a state of fine division, incorporated with a binder so that the material can be easily manipulated and molded in the fingers almost like wax. It is molded to fit the cavity accurately, the binder is burned out, leaving the model in the form of a porous mass, into the interstices of which a high-karat gold solder is flowed, making a solid inlay. With it the equivalent of a cast gold filling can be made in a fraction of the time required to make the cast inlay. No casting machine is used, and the exceedingly small investment enables the solder to be almost immediately melted at comparatively low heat, without waiting for a large investment to be dried out and heated, as in casting.

Consolidated Dental Mfg. Co. offer the *Flexible Metal Inhaler Tubing,* a gas-tight tubing, pliable enough to be tied in a knot, with threaded connections at both ends to fit the inhaler and gasometer.

New Gas Regulator for Vulcanizers.

Improved Aseptic Bracket Table, New Model No. 322.

"Modelrite"—a modeling compound of exceptional merit.

Third Edition of "Principles and Practice of Crown and Bridge Work," by Dr. Hart J. Goslee.

Johnson & Johnson, New Brunswick, N. J., offer the *Aseptic Cotton Font* with continuous feed of compressed coil package of Dentoform absorbent cotton.

The desired amount of cotton is detached with the pliers, using one hand only; reloaded with a new package instantly.

Red Cross Aseptic Glass Jar for Dental Rolls—an air-tight glass receptacle, dust-proof and absolutely clean.

Aseptic Glass Dish for Dental Napkins, a shallow square dish (glass) made just to accommodate the six-inch aseptic dental napkin.

Paper Tray Mat for use in the bottoms of the trays of the Lee S. Smith Aseptic Dental Cabinet.

Buffalo Dental Mfg. Co. offer the *Lewis Electric Mouth Illuminator*, a very practical light for the chair. It is equipped with a shutter, enabling the operator to increase the circle of light from two to eight inches. The ball-and-socket joints permit the illuminator to be tilted so that no ray of light strikes the operator's eyes, while the bracket tray remains flooded with light.

Lewis Adjustable Soldering Block Holder. This new device will hold any soldering block of carbon or asbestos firmly and without danger of displacement.

L. D. Caulk Company very kindly gave us some information concerning a new plastic filling material which, in the process of manufacture, differs radically from any similar filling material. The material is to be called *De Trey's Synthetic Cement.* The formula was originated in the laboratories of the De Trey Brothers at Zurich, Switzerland.

Dr. Wilbur F. Litch of Philadelphia has conducted a series of experiments with this cement, and kindly gave me a report of the results of his experiments, as follows:

My experimental work with this silicate preparation dates from October 1, 1910. On various dates during that month I filled with it some fifty cavities in the labial, approximal, incisal, and occlusal surfaces of upper incisors, canines, and bicuspids. Since the receipt of your letter, February 16, 1911, I have made a careful examination of the condition of nearly all of these fillings, and have found that thus far, both in regard to color and resistance to chemical disintegration, the results are excellent.

A notable quality of the Synthetic cement is its translucence. When the proper shade is selected, the reproduction of the enamel effect is so perfect that careful scrutiny at very close range is required to detect a filling. In my tests this remains true after nearly five months of wear.

Thus far there is no evidence of chemical disintegration, even on the approximal surfaces of bicuspids in close contact with adjoining teeth. The molecular bond of the constituents of the cement appears to be strong enough to entirely resist attack by such acids or alkalis as under varying conditions are present in the mouth.

Resistance to hard and long-continued mechanical wear is not to be expected. In my tests on this point, I have selected favorable cases, such as a compound cavity in a bicuspid of the sanguinous type, where all the other teeth are serviceable and in perfect occlusion, thus limiting wear on any one tooth. As yet no wear is discernible.

On November 26, 1910, one-half of a central incisor, broken off by a blow and devitalized, was restored to full contour with the Synthetic cement. This case was also favorable, as the pulp chamber could be used for anchorage, and, moreover, in occlusion the lower front teeth are considerably inside of the upper, thus lessening the strain upon the filling. On examination today it was found in perfect condition, with the exception of a small piece that was broken off at the mesial corner.

The working qualities of the Synthetic cement are excellent. When mixed to the correct consistence it affords about two minutes of time for filling and contouring before crystallization begins. This is usually ample.

Thus far there is not the slightest evidence of pulp devitalization in any of the teeth I have filled with Synthetic cement. What the future may develop remains to be seen, but the results up to the present time

give every reason for the hope and belief that it will prove a safe, sightly, and durable filling material.

A. C. Clark & Co. present several new styles in cuspidors. Their latest offering is a *Finger-bowl Attachment* to the fountain cuspidor. This promises to be a most useful improvement, affording a convenient place to wash the fingers after an examination or adjustment of the rubber dam previous to beginning the operation.

Pelton & Crane Co. *The Hadley Obtunder.* This effective spray obtunder was invented by Drs. W. A. Cook and G. S. Hadley. There are two tubes leading to the nozzle, one from the ether in the bottle, the other from the air-supply. The upper tube carries air, which is forced out around the top of the tube carrying the ether. The tooth to be operated on is covered with a pledget of cotton wetted with ether, then the spray is turned on the cotton, using just enough to keep the cotton moist. After the chill has passed, the cotton is removed slowly; if there is any pain, it is replaced for a moment. As soon as the patient feels no chill, the operation is commenced, having the assistant spray during the operation. The ether should be shut off entirely every few seconds to allow the air to blow all the chips and moisture out of the cavity. *Never* should the assistant be allowed to flood the cavity, as that will interfere with the operating. Colgate's Dactylis is used to disguise the ether. This acts nicely, leaving the odor of perfume. The lower lever should be used a great deal: it shuts off the ether—and it is easy to use too much. A small card is placed under the rubber and over the nose, to protect it and to keep the rubber from being drawn against the nostrils.

The *Air-compressor Cabinet* and the *Switchboard and Air-compressor Cabinet Combined* are very ornamental and convenient, and conceal these apparatus from the view of the patient. Recent innovations in dental cabinets have combined the switchboard in the cabinets, which seems to be a most practical idea. The switchboard is partially hidden from view, adds to the attractiveness of the cabinet, and is protected, when not in use, by a glass door.

The Pelton *Prophylaxis Atomizer,* cut-off, gold annealer, furnaces, spray bottle, and water-heaters are exceptionally good articles. The water-heater is very useful in softening inlay wax to the proper temperature without overheating, as is so frequently done by other methods.

Traun Rubber Co. *Gold Dust Rubber.* This company offers a remedy for the non-conductivity of dental rubber bases. This great obstacle to the success of the vulcanite denture has been overcome or lessened by a material which possesses the heat-conducting capacity of metal, together with the plastic properties of vulcanite rubber. The product is known as Gold Dust Rubber. Finely pulverized aluminum is thoroughly and evenly distributed through the whole of the rubber mass, forming a continuous heat-conducting network. The particles of metal decrease the chances of porosity, the specific gravity is low, the appearance is pleasing. It has good strength, is easily polished, and is a very superior rubber for vulcanite dentures.

Bellodora: a perfumed dental dam, with a very delicate fragrance which will prove to be very pleasing to the most fastidious.

E. De Trey & Son's offering to the profession is the *Stark Somnoform Inhaler.*

The Stark inhaler possesses several marked advantages over the De Trey inhaler: (1) There is a gas-tight valve between the bag and the facepiece. This locks the somnoform vapor in the bag until administration begins. Manipulation of this valve then admits somnoform vapor, in any desired amount, into the facepiece for inhalation. (2) There are air-openings on either side of the facepiece. Through these the patient receives fresh air and exhales the contaminated air. The openings are controlled by the lever, which controls the somnoform valve. As the lever is pushed down, the passageway to the bag is gradually opened for somnoform vapor, and the air-openings are diminished. Any desired mixture of somnoform and air may be administered for any required period. (3) The somnoform vapor may be retained in the Stark inhaler for several minutes; this permits a second administration, should it be desired. (4) The Stark inhaler may be readily transformed into a convenient ether cone, when subsequent ether anesthesia is desired. This cannot be done with the De Trey inhaler.

Young Dental Mfg. Co. The *Correct Capsicum Cup* is a very practical counter-irritant for application to the gums. The gums should first be cleansed with hydrogen dioxid and water. The cup is applied to the moist gum directly over the roots of the affected tooth, and pressed with the finger or a flat instrument until the rubber flattens, thus expelling the air and maintaining the cup in its proper place.

Young's Polishers, for cleaning teeth and polishing fillings, are made on the heads of the screws; they fit Model No. 303, never slip, run true, and outlast other polishers. A mandrel for the polishers is also made for the Universal handpiece.

Friedman Bros. of Chicago offer several new and meritorious specialties:

Germania Inlay Bur, a cross-cut fissure bur of a tapering cone shape, which cuts very rapidly, clogs less, and holds its temper better than the average bur.

Safe-side Bur, which prevents injuring the margins, side walls, or adjoining teeth; especially indicated for squaring the shoulders for porcelain jacket crowns and the gingival cavity margin.

Short Twist Drill for very rapid cutting through teeth, inlays, or amalgam fillings.

A fissure tapering cone-shaped *Finishing Bur,* which cuts either way and with which a very symmetrical cavity and good margin can be obtained. Personal experience with these burs and drills enables me to recommend them highly.

Lee S. Smith & Son Co. are aiding the great oral hygiene movement by their magazine *Oral Hygiene.* This magazine is published at their own expense, and is mailed monthly to every dentist in the United States, and also to several thousands abroad. This medium, if it is used by the profession, will render humanity a most valuable service.

The Smith *Green Carborundum Cavity Dressers,* for inlay work in various shapes and sizes for straight and right-angle handpieces, are very good.

A very attractive *Medicine Cabinet* of pressed steel finished in white enamel. This cabinet has four circular shelves which revolve independently, and is a very useful adjunct to the aseptic, white office.

Pennsylvania Mfg. Co. offer the *Evslin Interchangeable Tooth.*

It is manipulated in the same way as a

pin tooth, making one's own backing, no ready supplied backings being required. The anterior teeth can be protected at the bite by grinding to an angle of forty-five degrees, at which angle the tooth slides over the bite into position, giving protection without showing gold. The posterior teeth are provided with all-porcelain cusps. Their construction, combined with the formation of the pin, produces a tooth of exceptional strength.

Electro-Dental Mfg. Co. have added a new feature to their electric engine, a *Convertible Controller,* which is arranged with a small trigger the set of which allows the lever to oscillate or lock in each speed, at the will of the operator.

Another recent addition is the small metal *Frame Table* with glass top, which may be attached to any of their folding bracket engines. This is compact and takes up very little space. It does not interfere with the arm or handpiece, and should be quite a convenience.

Ransom-Randolph Co. offer the *Price Artificial Stone.* This system offers perhaps the best results to those who prefer the impression method of making inlays. The excessive shrinkage in the three-surface inlay is entirely overcome.

Columbia Dental Mfg. Co. offer a splendid *Posterior Porcelain Cusp Tooth.* It was practically ready for the market two years ago, when improvements essential to its interchangeability were devised, necessitating delay. The posterior teeth have a ridge-lap of porcelain for adaptation to the tissue, saddle, or plate; as the case demands. The backing fits a flat ground surface at an angle divergent to the plane of the cusps. The post of the backing enters a hole ground in the direction of the greatest bulk of porcelain, and at an angle which avoids direct pressure on the end of the post. A cross drilling engages the rib of the backing and forms a locking device which offsets the rotary motion of the jaw and relieves the pressure on the cement. The tooth, having a full cusp of porcelain, makes possible the construction of crowns or bridges without a display of gold, at the same time retaining the advantage of interchangeability. This feature is of incalculable value in case of absorption, hypertrophy, or breakage, as has been demonstrated by the success of Steele's Interchangeable Facings.

They also show a new form of polish for porcelain, *Gloss Sticks.* These are a combination of materials, each of the two sticks being applied separately to felt wheels. They smooth or polish ground surfaces more effectively than has been considered possible, and are of especial value to users of Steele's Interchangeable Teeth.

Detroit Dental Mfg. Co. offer a number of good specialties:

Ready-made, Non-changeable Approximate Models—designed by Dr. F. W. Greene. These are to be used as a base to vulcanize on, for replacing the body of plaster, which is changeable under heat. The models are made of cast aluminum, one hundred different shapes in a set, eighty-seven uppers and thirteen lowers. A model is selected which will slip loosely into the impression, a good plaster is mixed thin and the model is covered carefully, then a little is poured in the impression, full in the center; the besmeared model is pushed down into it, and finished as if it were all plaster.

Green-Kerr Removable-Handle Impression and Bite Tray. The handle may be removed while the tray and impression are in the mouth, allowing the patient to close the lips, enabling the op-

erator to obtain and observe the proper fulness of the face both in the impressions and the bite.

Perfection Impression Material in sticks for cavity and root impressions, also in base-plates for both upper and lower ridges.

Onderdonk Matrix Clamp. This clamp will permit of any contour, as the bands are cut for each case. This is especially useful for compound cavities for plastic work, and obtaining wax models for casting inlays.

Dental Pellet Mfg. Co., of Niagara Falls, New York, are showing a very handy *Pellet Holder.* It is cone-shaped, with a broad base. It has numerous perforations, which permit of pellets being easily grasped. They also manufacture a very absorbent *pellet* to be used in this holder.

Dentinol and Pyorrhocide Co., New York. A set of twelve improved *Dentinol Scalers.* The instruments are well designed, each being made for certain surfaces of the teeth. These twelve surfaces are applicable to all surfaces of all the teeth. Nos. 7 to 12 are so arranged as to allow the operator to work completely around the circumference of the posterior teeth. The blades of these instruments are cut at an angle which insures the contact of the entire cutting-edge with a root or tooth. Each instrument allows the use of the anterior teeth as a rest. The fulcrum remains the same in the use of each instrument.

Another useful adjunct to pyorrhea treatment is their *Dentinol Perfect Syringe.* The syringe is all glass, a ground-glass plunger taking the place of the usual mineral packing. The point is flat and is made of iridio-platinum, the flat point, held against the root, insuring the complete flushing of a pocket with the least irritation. The plunger stop is of metal, which can be removed for sterilization.

Lukens & Whittington Co. of Philadelphia offer the well-known and useful *Logan-Buckley Pyorrhea Instruments,* also the *Buckley Sterilizer* for sterilizing the above instruments. The sterilizer accommodates each instrument in its proper place, thus avoiding confusion and loss of time.

A revised set of the *Younger Pyorrhea Instruments* by Dr. Robt. Good. These instruments are made thin to pass under the gums easily. The entire point is a cutting-edge, so that no matter at what angle the instrument is held, it will cut.

Fletcher Bone Curettes and *Alveolitis Burs*—devised by Dr. M. H. Fletcher of Cincinnati. These are to be used for cutting away dead and diseased bone about or beyond the roots of the teeth, but are not suited or intended for removing calcareous deposits. After the tartar has been removed and the roots have been polished, the removal of the dead bone in diseases of the alveolar process is just as essential as when found in other parts of the body. The instruments are of the hoe and hatchet shapes, and are of suitable lengths and sizes to reach either shallow or deep-seated zones of dead bone, which is usually found in this disease. The blades cut both on the ends and the sides.

Roscoe H. Vollard Aseptic Lance, made of the finest tempered steel and finest point consistent with use, is an instrument designed for puncturing rather than for cutting, as the curved bistoury is generally used.

Dalton Bandless Crown Remover. This is designed especially for removing Logan and bandless crowns. In using, first the beaks on the lingual side are

adjusted, then the opposite beaks are allowed to slip along the labial surface until they find the point of contact of the root, the thumb-screw is then slowly tightened, and the crown will come away without any pain or injury to the crown or root.

A complete set of *Nevins Bald-Beaked Forceps,* this being an improvement on the heavy blunt beak with a sharp cutting-edge running up the full length of the beak. Experience has proved that above the first half of the beak the sharp edge is of no value, and often does serious damage to adjoining teeth by clipping off a corner, chipping the enamel, or catching hold of a filling, pulling it out, or cutting off a portion. These faults are overcome by the Nevins forceps, twenty-five in number.

Cryer Aseptic Root Extractors—devised by Dr. M. H. Cryer. They are made entirely of metal, the steel instrument being welded into the brass handle. The best quality of material is used, and particular attention is given to a proper temper of the steel. The handles are designed to give the operator a firm and comfortable hold.

A SUPERIOR INSTRUMENT METAL.

An editorial from the *Dental Summary* is here quoted, which contains the following interesting information regarding a superior instrument metal:

Recently there has been found, in an alloy of cobalt and chromium, a metal which not only rivals steel in cutting qualities, but also possesses a resistance to atmospheric influences which is perhaps equaled only by gold and the metals of the platinum group. Ellwood Haynes, the inventor, describes this interesting alloy, which he has named "stellite," in the *Scientific American* supplement of November 19th.

In color the metal stands between silver and steel, and if suitably polished it shows a high luster. A test was also made of the modulus of elasticity of the material, which was found to be fully equal to that of steel. These tests were made on one of the first bars produced, and I am pretty well satisfied that much higher results could now be obtained.

Notwithstanding the great hardness of the alloy, it not only forges readily at a red heat, but can be bent at a right angle cold, either in the form of a cast or forged bar, provided the dimensions do not exceed one-fourth inch square. Its elastic limit is not quite equal to that of tool steel of the same hardness, but it is much tougher. Samples can also be made showing much greater hardness than those described above, but the breaking strain and elastic limit will, under these circumstances, closely coincide.

Blades made from the alloy take a fine cutting-edge, which is particularly smooth, though capable of excellent cutting qualities. A small chisel, about one-fourth inch square, will readily cut a twenty-penny wire nail in two without marring the edge of the tool. A lathe tool made from the alloy, with certain modifications, is capable of cutting ordinary steel at a very high rate of speed. A test was made against high-speed steel, and it was found that the stellite tool would cut a continuous shaving from the bar at the speed of 200 feet per minute, while the high-speed alloy steels failed almost instantly. It does not, of course, follow from this that the alloy is better suited for high-speed lathe tools than good alloy steel, but simply that it will stand a higher speed without burning.

Hydrofluoric acid acts very slowly on the alloy, and its action seems to be similar to that of hydrochloric acid, though not so pronounced. With the exception of the above acids, the alloy is practically inert to all other chemical reagents. A polished piece may be boiled in nitric acid for hours without having its luster diminished in the slightest degree. The alloy may also be boiled in solutions of the caustic alkalies for an indefinite length of time without the slightest effect. It is likewise proof against all atmospheric influences, and will retain its luster under all circumstances, no matter whether the atmosphere is dry or moist, or

even heavily laden with acid vapors, sulfureted hydrogen, or other corrosive gases.

Mr. Haynes further states that if suitably ground and polished, the metal presents a beautiful white and lustrous surface, and while its color is not quite equal to that of silver, it is always permanent and agreeable to the eye. Combined with this permanence and beauty of finish, it possesses cutting qualities comparable to those of good steel. It also holds a permanent edge, and seldom requires sharpening.

The alloy is also well suited for the manufacture of surgical instruments, since it is not at all affected by mercuric chlorid or other sterilizing solutions which severely corrode steel instruments. It will also probably have considerable application in dentistry and watch-making. For instruments to be used in the chemical or physical laboratory, it is the material *par excellence*. The writer knows from experience that it is a great satisfaction to have spatulas, scrapers, and other tools remain perfectly bright in the chemical laboratory.

If these tests and observations prove correct, dentists have promise of a grade of instruments which more nearly meets their requirements than any yet produced.

Respectfully submitted,

W. H. Scherer, Houston, Tex., *Chairman.*
Celia Rich, Nashville, Tenn.
F. W. Stiff, Richmond, Va.

Report of Committee on Oral Hygiene.

The next order of business was the report of the Committee on Oral Hygiene, by Dr. J. P. Corley, chairman, as follows:

The committee has no formal report to make, because we have not had time to prepare a report. I can, however, in a few words tell you about what the situation is, if that will be satisfactory. First, as to the financial situation. The committee received five hundred dollars at the Houston meeting for its use. The National committee made an appeal for funds, and in answer to that appeal, we sent an order for $120 to the Educational bureau. Dr. Ebersole promised to return the money to the Southern Branch if it could be collected this summer from the National Dental Association.

The presence of the speakers last evening cost the committee $240. I do not know how much this exhibit will cost, but our year's expenses will easily come within the five-hundred dollar appropriation. As to the continuing of this work, the committee will have to have finances for the next year, and I am ready to give $25 toward another appropriation.

Motion was made and carried that the report be adopted.

Report of Committee on Operative Dentistry.

The next order of business was the report of the Committee on Operative Dentistry, by Dr. A. R. Melendy, chairman, as follows:

Your Committee on Operative Dentistry beg to report that they secured the promise of seven papers, four of which have been presented to this meeting, while the proposed speakers who have not appeared have made reasonable excuses for their non-appearance.

Respectfully submitted,

(Signed) A. R. Melendy, *Chairman.*

Motion was made and carried that the report be adopted.

Votes of Thanks.

The Executive Committee, through the secretary, Dr. A. J. Cottrell, presented the following resolutions:

RESOLVED, That a vote of thanks be extended to the city of Atlanta and its citizens generally for the cordial reception and kind treatment accorded us; to the Local Committee on Arrangements for the many provisions made for our comfort and for what they have done to contribute to the success of the meeting; to the president and all the officers and committees who have supported him for the excellent program provided and for the efficient manner in which the meeting has been conducted, and especially to those members of the profession who have come from a distance to appear before us and have greatly added to the interest of the meeting.

Whereas, the Piedmont Hotel management has very graciously and efficiently aided us in carrying out our program; be it

RESOLVED, That this association extend to the management its sincere appreciation and thanks; and be it further

RESOLVED, That a copy of this resolution be spread upon the minutes of the association and a copy be forwarded to the managers, Mr. H. M. Dutton and Mr. Harry Burghard.

Whereas, the *Atlanta Constitution*, the *Atlanta Georgian*, and the *Atlanta Journal* have rendered excellent services in reporting our deliberations and transactions, and in every other way have shown their willingness and anxiety to further the interests of this meeting; be it therefore

RESOLVED, That it is the sense of the Southern Branch of the National Dental Association that these papers be thanked for their successful efforts in helping to make this meeting a success.

And be it further

RESOLVED, That these resolutions be spread upon the minutes of the association, and that a copy be forwarded to each of the above-mentioned papers.

Respectfully submitted,

A. J. COTTRELL, *Ch'man Ex. Com.*

The next order of business was the report by the treasurer, Dr. B. D. BRABSON, as follows:

Report of the Treasurer.

Balance on hand from 1910	$1120.14
Received—From 133 dues, up to Atlanta meeting, 1911	665.00
	$1785.14
Disbursed, as per vouchers	1232.05
Balance on hand	$553.09

Respectfully submitted,

B. D. BRABSON, *Treasurer.*

Approved:

V. E. TURNER.
A. J. COTTRELL.
B. HOLLY SMITH,
CHAS. L. ALEXANDER,
R. W. CARROLL,
W. A. DEAN,
Auditing Committee.

Motion was made and carried that the report be received.

The next order of business was the selection of the place of meeting for the next annual meeting. The Chair announced that as the next annual meeting of the National Association would be held in the South, the Southern Branch would meet at the same time and place.

Election of Officers.

The election of officers for the ensuing year was the next order of business, and resulted as follows:

President—S. W. Foster, Atlanta, Ga.

First Vice-president—W. H. Scherer, Houston, Texas.

Second Vice-president—R. B. Bogle, Nashville, Tenn.

Third Vice-president—C. M. Barnwell, Atlanta, Ga.

Recording Secretary—W. A. Dean, Tampa, Fla.

Corresponding Secretary—T. T. Moore, Jr., Columbia, S. C.

Treasurer—B. D. Brabson, Knoxville, Tenn.

Executive Committee—Dr. H. C. Hassel, for the unexpired term of Dr. J. P. Gray; Drs. Cottrell and Alexander re-elected to succeed themselves for the long term.

The secretary, Dr. W. A. Dean, read the minutes of the meeting, and they were approved as read.

The newly-elected officers were then installed.

Motion was made and carried that a vote of thanks be extended to the retiring officers for the very efficient work which they had done during the year.

There being no further business before the association, motion was carried to adjourn until the next annual session.